Open Water Information Architecture

California Department of Water Resources
Water Balance
Standard Operating Procedures

prepared by the Water Balance Team

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1 Water Balance Automation

Water balance is approached by (1) collecting the data entry spreadsheets from each regional office, (2) converting them to *.csv files according to a set of rules, (3) processing them into a controlled vocabulary and parameterization, (4) computing a set of equations based on the controlled vocabulary and parameterization, and then (5) summarizing the results at the DAUCO, HR, PA and ST levels of aggregation after applying adjustments at each spatial scale to account for water re-use at a given scale.

Table 1: Overview of standard operating procedures (SOPs) and categorization into quality control (QC), data publication (DP) and analysis (AN) procedures.

Procedure Type	Name	Purpose	Results
Quality Control (Figure 2)	qc1000	Read Level 0 input and make it conformal to the current controlled vocabulary and add geo-referencing.	wb1000: standardized Level 1 data which is split into wu1000, ws1000 as input to qc2300 and qc2400 respectively.
	qc2300	Compute AWU, DEP, NWx for water use.	wu2300
	qc2400	Compute the water balance equations for water supply	ws2400
	qc2500	Applies water use adjustment.	Writes the Water Use CSV files for PA, HR, ST and leaves a global version of wu2500 in the workspace.
	qc2600	Computes the verification tables.	Writes the Water Supply CSV files for PA, HR, ST and leaves a global version of ws2600 in the workspace.
Data Publication	DP-1000	(1) Prepare metadata and data package for publication. (2) Obtain digital object identifier and finalize processing. (3) Populate archive and catalogue with metadata and data respectively.	Various methods per Technical Working Group.
Data Distribution	API-1000	(1) Application programming interfaces to downstream use-cases.	Various methods per Technical Working Group.
Analysis	AN-1000	Produce the figures (1,2,...,n) and tables (1,2,...,n) necessary.	AN-1000.R

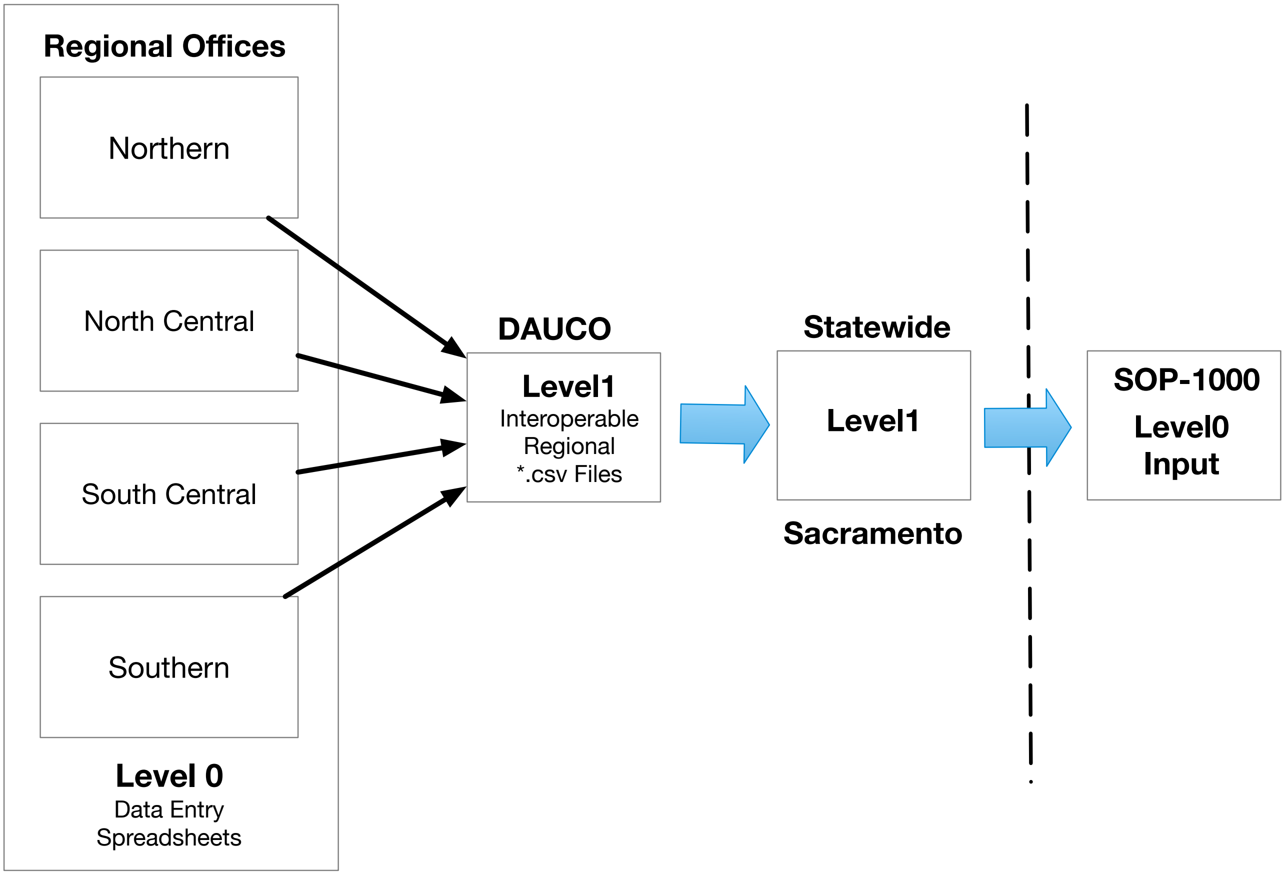


Figure 1: Data acquisition workflow from Regional Offices to Sacramento.

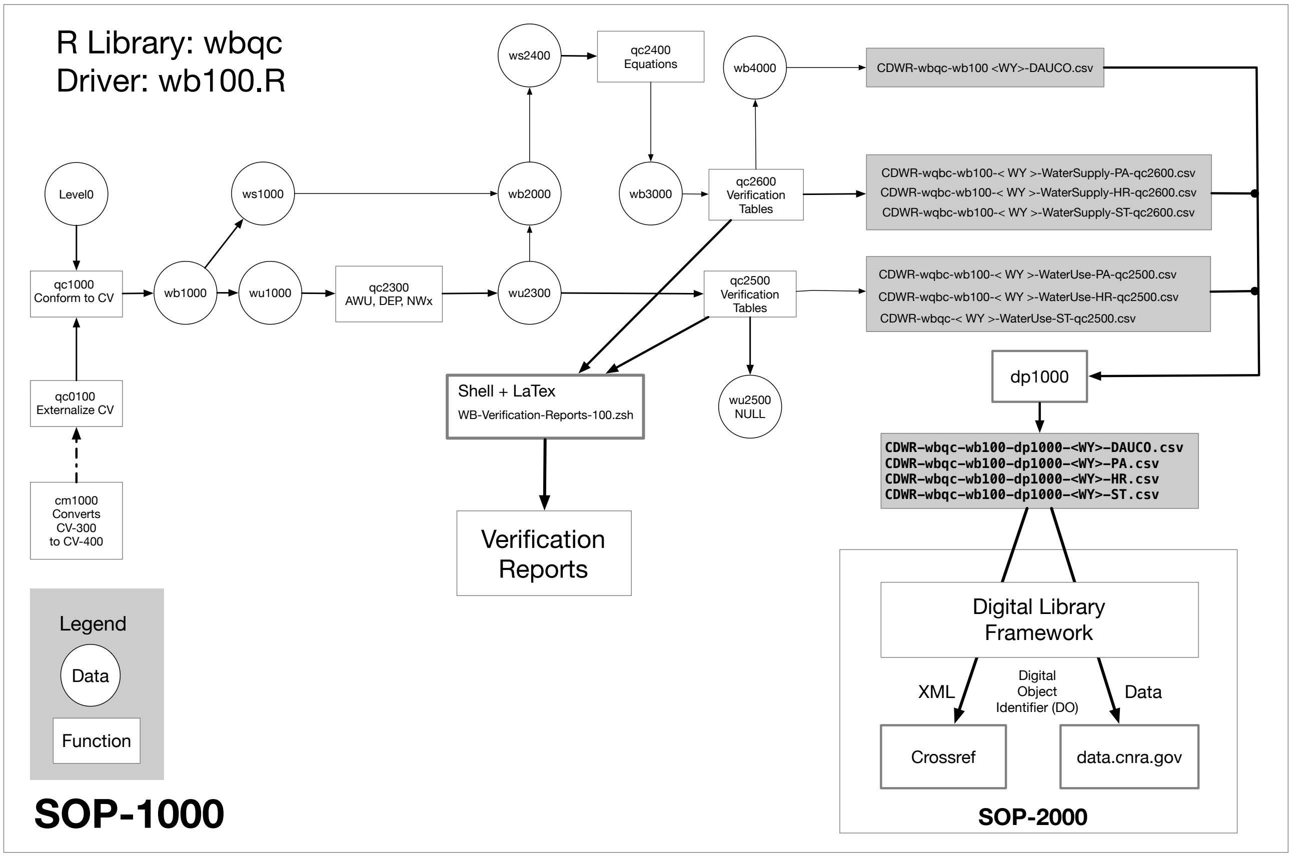


Figure 2: Quality control dataflow diagram. The workflow is implemented in the R language as the *wbqc* package. It is developed and maintained by J. Helly (jjh@hellylab.net).

2 Interoperabilility

A guiding principle of automation development is providing the greatest interoperability of water balance data with respect to other downstream processing. Listing **??** provides the R function that is at the heart of what we refer to as Table 2; a multi-year summary of the water balance data suitable for non-specialist comprehension. This is a table that has been prepared for each release of the water plan. Although it is based on the water balance data, the aggregation and categorization scheme for this table is different from that is implicit in the controlled vocabulary (5). Consequently, it is presented here as an example of the flexibility in automatically generating an alternative tabulation of the water balance data.

3 Conceptual Diagrams of Water Balance Components

Figure 3 displays the overview of the water balance components.

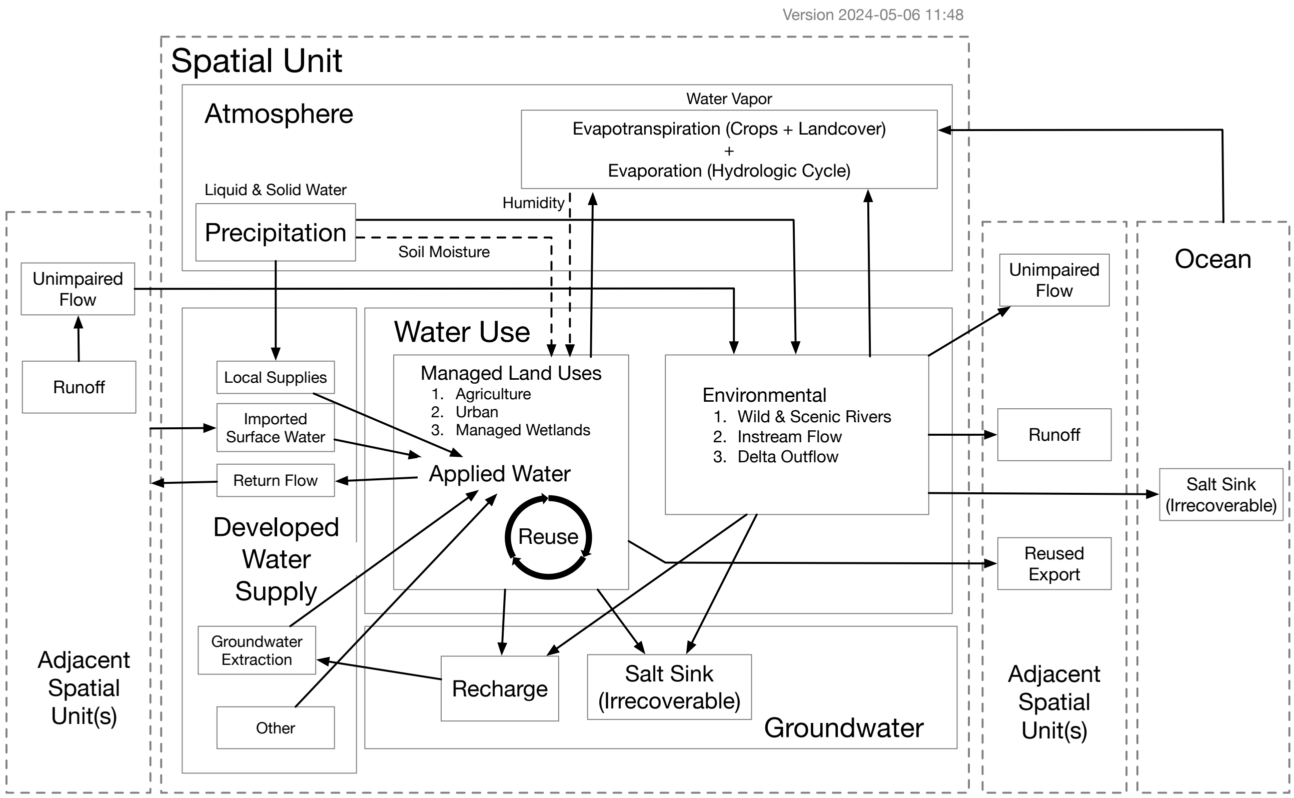


Figure 3: Overview of water balance components.

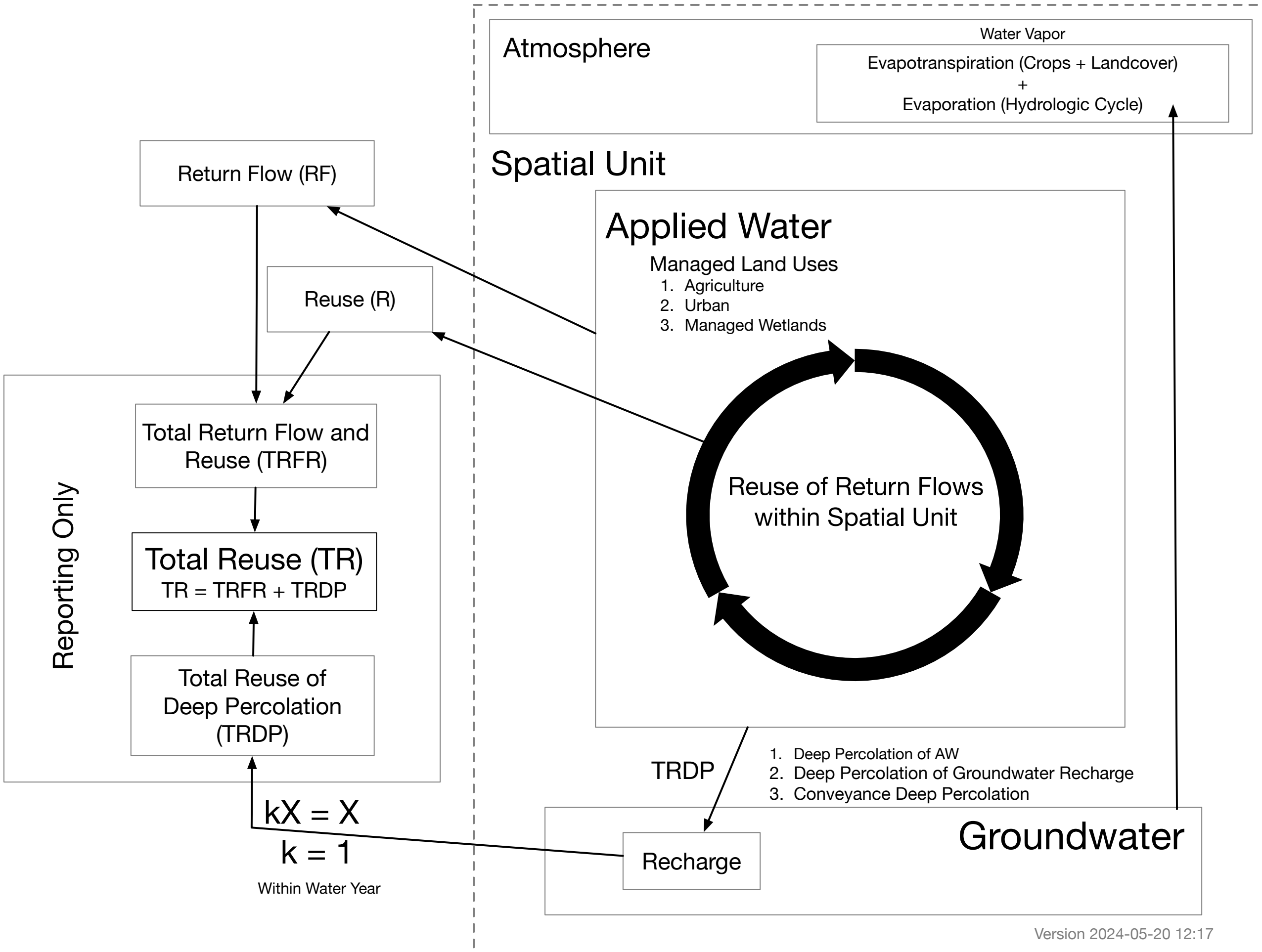


Figure 4: Reuse of water supply. Note that the circle labelled *Reuse* in Figure 3 is labelled *Reuse of Return Flows within Spatial Unit* here.

3.1 Governing Equations

The general form of the governing equations are linear sums. However, there are four sets of equations: two for water use and two for water supply. They are applied sequentially as shown in Figure 2. The water use equations (Listings 1, 2) computes quantities at the DAUCO-level for parameters that are computed from the Level 1 data for each of the sectors: (1) agriculture, (2) urban, (3) instream flow requirements, (4) managed wetlands, (5) required delta outflow, (6) wild and scenic rivers. The second set of equations (Listings 3, 4) computes adjustments in the return flows at the three other spatial scales: state (ST), hydrologic region (HR), and planning areas (PA).

3.2 Software

All of the water balance processing is done with the R software [1]. The functions referred to are those within the *wbqc* package: developed and maintained by J. Helly (jjh@hellylab.net).

3.2.1 Shell + LaTex

3.2.2 SOP-2000: DOI Generation

4 Glossary and Controlled Vocabulary

4.1 Overview

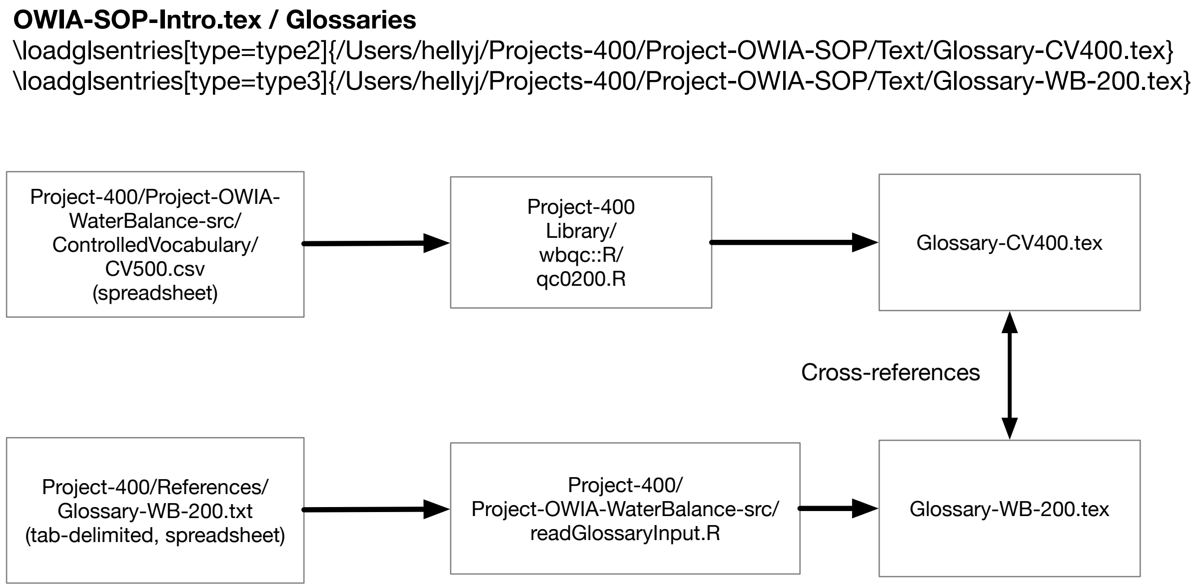


Figure 5: Dataflow for the Water Balance Automation SOP Glossaries.

4.2 Contributors

These SOPs were developed jointly by Brad Arnold, Glenn Bergquist, Brian Bettencourt, Alyse Briody, Dona Calder, Abby Carevic, Tito Cervantes, Dong Chen, James Common, Matt Correa, Gary Darling, Siran Erysian, Steve Ewert, Robert Fastenau, Todd Flackus, Francisco Guzman, Jason Harbaugh, Scott Hayes, John Helly, Todd Hillaire, Salma Kibrya, Jennifer Kofoid Stricklin, Kelly Lawler, Dimitri Lee, Michael McGinnis, Salomon Miranda, Lew Moeller, Chris Montoya, Mohammed Mostafavi, Daya Muralidharan, Morteza Orang, Toni Pezzetti, Lida Pirjaberi, Mark Rivera, Jessica Salinas Brown, Jane Schafer-Kramer, Michael Serna, Gholam Shakouri, Paul Shipman, Jeff Smith, Carli Sperisen, Evelyn Tipton, George Valente, Lauren Wacker, Paul Wells, Muffet Wilkerson, and Courtney Wilson.

5 Governing Equations

This section provides the listings of the core sets of equations within R-coded functions.

5.1 Water Use by Sector

Listing 1: First set of water use equations.

```
qc2310 = function(df){
#browser()
# ==========================================================================
# Water Use by Sector: Translation of TH formulas
# ==========================================================================
EQ = data.frame(ncols=1)
#
EQ$AWUAG =          sum(df[df$CategoryD=='AG001',   ]$TAF) +
                    sum(df[df$CategoryD=='AG002',   ]$TAF)

EQ$NW001AG = EQ$AWUAG - sum(df[df$CategoryD=='AG005',   ]$TAF) -
                        sum(df[df$CategoryD=='AG007',   ]$TAF) -
                        sum(df[df$CategoryD=='AG008',   ]$TAF)

EQ$DEPAG =          sum(df[df$CategoryD=='AG003',   ]$TAF) +
                    sum(df[df$CategoryD=='AG004',   ]$TAF) +
                    sum(df[df$CategoryD=='AG006',   ]$TAF) +
                    sum(df[df$CategoryD=='AG009A',  ]$TAF) +
                    sum(df[df$CategoryD=='AG009B',  ]$TAF) +
                    sum(df[df$CategoryD=='AG009C',  ]$TAF) +
                    sum(df[df$CategoryD=='AG009E',  ]$TAF) +
                    sum(df[df$CategoryD=='AG009F',  ]$TAF) +
                    sum(df[df$CategoryD=='AG010A',]$TAF) +
                    sum(df[df$CategoryD=='AG010B',]$TAF) +
                    sum(df[df$CategoryD=='AG012', ]$TAF)

EQ$NW002AG = EQ$DEPAG + sum(df[df$CategoryD=='AG011A',]$TAF) +
                        sum(df[df$CategoryD=='AG011B',]$TAF) +
                        sum(df[df$CategoryD=='AG011C',]$TAF) +
                        sum(df[df$CategoryD=='AG011D',]$TAF)
```

```
#
EQ$DEPAGC =       sum(df[df$CategoryD=='AG017',  ]$TAF) +
                  sum(df[df$CategoryD=='AG018A',]$TAF) +
                  sum(df[df$CategoryD=='AG018B',]$TAF) +
                       sum(df[df$CategoryD=='AG018C',]$TAF) +
                       sum(df[df$CategoryD=='AG018D',]$TAF) +
                       sum(df[df$CategoryD=='AG018E',]$TAF) +
                       sum(df[df$CategoryD=='AG018F',]$TAF) +
                       sum(df[df$CategoryD=='AG019A',]$TAF) +
                       sum(df[df$CategoryD=='AG019B',]$TAF) +
                       sum(df[df$CategoryD=='AG023',  ]$TAF)

EQ$NW002AGC=EQ$DEPAGC + sum(df[df$CategoryD=='AG020A',]$TAF) +
                          sum(df[df$CategoryD=='AG020B',]$TAF) +
                               sum(df[df$CategoryD=='AG020C',]$TAF)
EQ$NW001AGC=EQ$NW002AGC

EQ$AWUAGC=EQ$NW001AGC +   sum(df[df$CategoryD=='AG021',  ]$TAF) +
                         sum(df[df$CategoryD=='AG022',  ]$TAF)
#
# Urban
#
EQ$AWUURB=            sum(df[df$CategoryD=='URB001',  ]$TAF) +
                  sum(df[df$CategoryD=='URB002',  ]$TAF) +
                  sum(df[df$CategoryD=='URB003',  ]$TAF) +
                  sum(df[df$CategoryD=='URB004',  ]$TAF) +
                  sum(df[df$CategoryD=='URB005',  ]$TAF) +
                  sum(df[df$CategoryD=='URB006',  ]$TAF) +
                  sum(df[df$CategoryD=='URB007',  ]$TAF) +
                  sum(df[df$CategoryD=='URB008',  ]$TAF) +
                  sum(df[df$CategoryD=='URB009',  ]$TAF)

EQ$NW001URB=EQ$AWUURB - sum(df[df$CategoryD=='URB012',  ]$TAF) -
                  sum(df[df$CategoryD=='URB014',  ]$TAF) -
```

```
                         sum(df[df$CategoryD=='URB015A', ]$TAF) -
                         sum(df[df$CategoryD=='URB015B',]$TAF) +
                         sum(df[df$CategoryD=='URB015C',]$TAF)

EQ$DEPURB= sum(df[df$CategoryD=='URB010', ]$TAF) +
      sum(df[df$CategoryD=='URB011', ]$TAF) +
      sum(df[df$CategoryD=='URB013', ]$TAF) +
      sum(df[df$CategoryD=='URB016', ]$TAF) +
      sum(df[df$CategoryD=='URB017A',]$TAF) +
            sum(df[df$CategoryD=='URB017B',]$TAF) +
            sum(df[df$CategoryD=='URB017C',]$TAF) +
            sum(df[df$CategoryD=='URB017D',]$TAF) +
      sum(df[df$CategoryD=='URB017E',]$TAF) +
            sum(df[df$CategoryD=='URB017F',]$TAF) +
            sum(df[df$CategoryD=='URB018A',]$TAF) +
            sum(df[df$CategoryD=='URB018B',]$TAF) +
            sum(df[df$CategoryD=='URB020', ]$TAF)

EQ$NW002URB=EQ$DEPURB + sum(df[df$CategoryD=='URB019A',]$TAF) +
            sum(df[df$CategoryD=='URB019B',]$TAF) +
            sum(df[df$CategoryD=='URB019C',]$TAF) +
            sum(df[df$CategoryD=='URB019D',]$TAF)

EQ$AWUURBC=          sum(df[df$CategoryD=='URB025', ]$TAF) +
            sum(df[df$CategoryD=='URB026A',]$TAF) +
            sum(df[df$CategoryD=='URB026B',]$TAF) +
            sum(df[df$CategoryD=='URB026C',]$TAF) +
            sum(df[df$CategoryD=='URB026D',]$TAF) +
            sum(df[df$CategoryD=='URB026E',]$TAF) +
            sum(df[df$CategoryD=='URB026F',]$TAF) +
            sum(df[df$CategoryD=='URB027A',]$TAF) +
            sum(df[df$CategoryD=='URB027B',]$TAF) +
            sum(df[df$CategoryD=='URB028A',]$TAF) +
            sum(df[df$CategoryD=='URB028B',]$TAF) +
```

```
                    sum(df[df$CategoryD=='URB028C',]$TAF) +
                    sum(df[df$CategoryD=='URB029', ]$TAF) +
                    sum(df[df$CategoryD=='URB030', ]$TAF) +
                    sum(df[df$CategoryD=='URB031', ]$TAF)

EQ$NW001URBC=EQ$AWUURBC-sum(df[df$CategoryD=='URB029',]$TAF)-
                    sum(df[df$CategoryD=='URB030',]$TAF)

EQ$DEPURBC=             sum(df[df$CategoryD=='URB025',]$TAF)   +
                    sum(df[df$CategoryD=='URB026A',]$TAF) +
                    sum(df[df$CategoryD=='URB026B',]$TAF) +
                    sum(df[df$CategoryD=='URB026C',]$TAF) +
                    sum(df[df$CategoryD=='URB026D',]$TAF) +
                    sum(df[df$CategoryD=='URB026E',]$TAF) +
                    sum(df[df$CategoryD=='URB026F',]$TAF) +
                    sum(df[df$CategoryD=='URB027A',]$TAF) +
                    sum(df[df$CategoryD=='URB027B',]$TAF) +
                    sum(df[df$CategoryD=='URB031',]$TAF)

EQ$NW002URBC=EQ$DEPURBC+ sum(df[df$CategoryD=='URB028A',]$TAF) +
                     sum(df[df$CategoryD=='URB028B',]$TAF) +
                     sum(df[df$CategoryD=='URB028C',]$TAF)
#
# Managed Wetland
#
EQ$AWUMW=               sum(df[df$CategoryD=='MW001',]$TAF)

EQ$NW001MW=EQ$AWUMW - sum(df[df$CategoryD=='MW003',]$TAF) -
                                   sum(df[df$CategoryD=='MW005',]$TAF) -
                                   sum(df[df$CategoryD=='MW006',]$TAF)


EQ$DEPMW=           sum(df[df$CategoryD=='MW002', ]$TAF) +
                    sum(df[df$CategoryD=='MW004', ]$TAF) +
```

```
                     sum(df[df$CategoryD=='MW007A',]$TAF) +
                     sum(df[df$CategoryD=='MW007B',]$TAF) +
                     sum(df[df$CategoryD=='MW007C',]$TAF) +
                     sum(df[df$CategoryD=='MW007D',]$TAF) +
                     sum(df[df$CategoryD=='MW007E',]$TAF) +
                     sum(df[df$CategoryD=='MW007F',]$TAF) +
                     sum(df[df$CategoryD=='MW008A',]$TAF) +
                     sum(df[df$CategoryD=='MW008B',]$TAF) +
                     sum(df[df$CategoryD=='MW010',]$TAF)

EQ$NW002MW=EQ$DEPMW + sum(df[df$CategoryD=='MW009A',]$TAF) +
                      sum(df[df$CategoryD=='MW009B',]$TAF) +
                      sum(df[df$CategoryD=='MW009C',]$TAF) +
                      sum(df[df$CategoryD=='MW009D',]$TAF)

EQ$AWUMWC=           sum(df[df$CategoryD=='MW015',  ]$TAF) +
                     sum(df[df$CategoryD=='MW016A',]$TAF) +
                     sum(df[df$CategoryD=='MW016B',]$TAF) +
                     sum(df[df$CategoryD=='MW016C',]$TAF) +
                     sum(df[df$CategoryD=='MW016D',]$TAF) +
                     sum(df[df$CategoryD=='MW016E',]$TAF) +
                     sum(df[df$CategoryD=='MW016F',]$TAF) +
                     sum(df[df$CategoryD=='MW017A',]$TAF) +
                     sum(df[df$CategoryD=='MW017B',]$TAF) +
                     sum(df[df$CategoryD=='MW018A',]$TAF) +
                     sum(df[df$CategoryD=='MW018B',]$TAF) +
                     sum(df[df$CategoryD=='MW018C',]$TAF) +
                     sum(df[df$CategoryD=='MW019',  ]$TAF) +
                     sum(df[df$CategoryD=='MW020',  ]$TAF) +
                     sum(df[df$CategoryD=='MW021',  ]$TAF)

EQ$NW001MWC= EQ$AWUMWC - sum(df[df$CategoryD=='MW019',   ]$TAF) -
                                      sum(df[df$CategoryD=='MW020',   ]$TAF)
```

```
EQ$NW002MWC= EQ$AWUMWC- sum(df[df$CategoryD=='MW019', ]$TAF) -
                        sum(df[df$CategoryD=='MW020', ]$TAF)

EQ$DEPMWC=  EQ$AWUMWC-sum(df[df$CategoryD=='MW018A',]$TAF) -
                      sum(df[df$CategoryD=='MW018B',]$TAF) -
                      sum(df[df$CategoryD=='MW018C',]$TAF) -
                                 sum(df[df$CategoryD=='MW019', ]$TAF) -
                                 sum(df[df$CategoryD=='MW020', ]$TAF)
#
# Instream Flow Requirements
#
EQ$AWUIFR=       sum(df[df$CategoryD=='IFR001', ]$TAF)

EQ$NW001IFR=     sum(df[df$CategoryD=='IFR001', ]$TAF) -
                 sum(df[df$CategoryD=='IFR002', ]$TAF)

EQ$NW002IFR=     sum(df[df$CategoryD=='IFR003A',]$TAF) +
                 sum(df[df$CategoryD=='IFR003B',]$TAF) +
                 sum(df[df$CategoryD=='IFR003C',]$TAF) +
                 sum(df[df$CategoryD=='IFR004A',]$TAF) +
                 sum(df[df$CategoryD=='IFR004B',]$TAF) +
                 sum(df[df$CategoryD=='IFR004C',]$TAF)

EQ$DEPIFR=       sum(df[df$CategoryD=='IFR003A',]$TAF) +
                 sum(df[df$CategoryD=='IFR003B',]$TAF) +
                 sum(df[df$CategoryD=='IFR003C',]$TAF)
#
# Wild and Scenic Rivers
#
EQ$AWUWSR=       sum(df[df$CategoryD=='WSR001',]$TAF)

EQ$NW001WSR=     sum(df[df$CategoryD=='WSR001',]$TAF) -
                 sum(df[df$CategoryD=='WSR002',]$TAF)
```


Contact: J.J. Helly / jjh@hellylab.net

```
EQ$NW002WSR=        sum(df[df$CategoryD=='WSR003A',]$TAF) +
                    sum(df[df$CategoryD=='WSR003B',]$TAF) +
                    sum(df[df$CategoryD=='WSR003C',]$TAF) +
                    sum(df[df$CategoryD=='WSR004A',]$TAF) +
                    sum(df[df$CategoryD=='WSR004B',]$TAF) +
                    sum(df[df$CategoryD=='WSR004C',]$TAF)

EQ$DEPWSR =         sum(df[df$CategoryD=='WSR003A',]$TAF) +
                    sum(df[df$CategoryD=='WSR003B',]$TAF) +
                    sum(df[df$CategoryD=='WSR003C',]$TAF)
#
# Required Delta Outflow
#
EQ$AWURDO    = sum(df[df$CategoryD=='RDO001',]$TAF)
EQ$NW001RDO  = sum(df[df$CategoryD=='RDO001',]$TAF)
EQ$NW002RDO  = sum(df[df$CategoryD=='RDO002',]$TAF)
EQ$DEPRDO    = sum(df[df$CategoryD=='RDO002',]$TAF)
# ========================================================================
# Water Supply
# ========================================================================
EQ$SPLAG =          sum(df[df$CategoryD=='SPL001A',  ]$TAF) +
                    sum(df[df$CategoryD=='SPL002A1',]$TAF) +
                    sum(df[df$CategoryD=='SPL002B1',]$TAF) +
                    sum(df[df$CategoryD=='SPL002C1',]$TAF) +
                    sum(df[df$CategoryD=='SPL003A',  ]$TAF) +
                    sum(df[df$CategoryD=='SPL004A',  ]$TAF) +
                    sum(df[df$CategoryD=='SPL005A',  ]$TAF) +
                    sum(df[df$CategoryD=='SPL006A',  ]$TAF) +
                    sum(df[df$CategoryD=='SPL010A',]$TAF) +
                    sum(df[df$CategoryD=='SPL011A',]$TAF) +
                    sum(df[df$CategoryD=='SPL012A',]$TAF) +
                    sum(df[df$CategoryD=='SPL013A',]$TAF) +
                    sum(df[df$CategoryD=='SPL014A',]$TAF) +
                    sum(df[df$CategoryD=='SPL015A',]$TAF) +
```

```
                     sum(df[df$CategoryD=='SPL016A',]$TAF) +
                     sum(df[df$CategoryD=='SPL017A',]$TAF) +
                     sum(df[df$CategoryD=='SPL018A',]$TAF) +
                     sum(df[df$CategoryD=='SPL019A',]$TAF) +
                     sum(df[df$CategoryD=='SPL002D1',]$TAF)

EQ$SPLMW =           sum(df[df$CategoryD=='SPL001B', ]$TAF) +
                     sum(df[df$CategoryD=='SPL002A2',]$TAF) +
                     sum(df[df$CategoryD=='SPL002B2',]$TAF) +
                     sum(df[df$CategoryD=='SPL002C2',]$TAF) +
                     sum(df[df$CategoryD=='SPL003B', ]$TAF) +
                     sum(df[df$CategoryD=='SPL004B', ]$TAF) +
                     sum(df[df$CategoryD=='SPL005B', ]$TAF) +
                     sum(df[df$CategoryD=='SPL006B', ]$TAF) +
                     sum(df[df$CategoryD=='SPL010B',]$TAF) +
                     sum(df[df$CategoryD=='SPL011B',]$TAF) +
                     sum(df[df$CategoryD=='SPL012B',]$TAF) +
                     sum(df[df$CategoryD=='SPL013B',]$TAF) +
                     sum(df[df$CategoryD=='SPL014B',]$TAF) +
                     sum(df[df$CategoryD=='SPL015B',]$TAF) +
                     sum(df[df$CategoryD=='SPL016B',]$TAF) +
                     sum(df[df$CategoryD=='SPL017B',]$TAF) +
                     sum(df[df$CategoryD=='SPL018B',]$TAF) +
                     sum(df[df$CategoryD=='SPL019B',]$TAF) +
                     sum(df[df$CategoryD=='SPL002D2',]$TAF)

EQ$SPLURB =              sum(df[df$CategoryD=='SPL001C', ]$TAF) +
                     sum(df[df$CategoryD=='SPL002A3',]$TAF) +
                     sum(df[df$CategoryD=='SPL002B3',]$TAF) +
                     sum(df[df$CategoryD=='SPL002C3',]$TAF) +
                     sum(df[df$CategoryD=='SPL003C', ]$TAF) +
                     sum(df[df$CategoryD=='SPL004C', ]$TAF) +
                     sum(df[df$CategoryD=='SPL005C', ]$TAF) +
                     sum(df[df$CategoryD=='SPL006C', ]$TAF) +
```

```
                         sum(df[df$CategoryD=='SPL010C',]$TAF) +
                         sum(df[df$CategoryD=='SPL011C',]$TAF) +
                         sum(df[df$CategoryD=='SPL012C',]$TAF) +
                         sum(df[df$CategoryD=='SPL013C',]$TAF) +
                         sum(df[df$CategoryD=='SPL014C',]$TAF) +
                         sum(df[df$CategoryD=='SPL015C',]$TAF) +
                         sum(df[df$CategoryD=='SPL016C',]$TAF) +
                         sum(df[df$CategoryD=='SPL017C',]$TAF) +
                         sum(df[df$CategoryD=='SPL018C',]$TAF) +
                         sum(df[df$CategoryD=='SPL019C',]$TAF) +
                         sum(df[df$CategoryD=='SPL002D3',]$TAF)

EQ$SPLIFR =                  sum(df[df$CategoryD=='SPL001D', ]$TAF) +
                         sum(df[df$CategoryD=='SPL002A4',]$TAF) +
                         sum(df[df$CategoryD=='SPL002B4',]$TAF) +
                         sum(df[df$CategoryD=='SPL002C4',]$TAF) +
                         sum(df[df$CategoryD=='SPL003D', ]$TAF) +
                         sum(df[df$CategoryD=='SPL004D', ]$TAF) +
                         sum(df[df$CategoryD=='SPL005D', ]$TAF) +
                         sum(df[df$CategoryD=='SPL006D', ]$TAF) +
                         sum(df[df$CategoryD=='SPL010D',]$TAF) +
                         sum(df[df$CategoryD=='SPL011D',]$TAF) +
                         sum(df[df$CategoryD=='SPL012D',]$TAF) +
                         sum(df[df$CategoryD=='SPL013D',]$TAF) +
                         sum(df[df$CategoryD=='SPL014D',]$TAF) +
                         sum(df[df$CategoryD=='SPL015D',]$TAF) +
                         sum(df[df$CategoryD=='SPL016D',]$TAF) +
                         sum(df[df$CategoryD=='SPL017D',]$TAF) +
                         sum(df[df$CategoryD=='SPL018D',]$TAF) +
                         sum(df[df$CategoryD=='SPL019D',]$TAF)

EQ$SPLWS =                   sum(df[df$CategoryD=='SPL001E', ]$TAF) +
                         sum(df[df$CategoryD=='SPL002A5',]$TAF) +
                         sum(df[df$CategoryD=='SPL002B5',]$TAF) +
```

```
                    sum(df[df$CategoryD=='SPL002C6',]$TAF) +
                    sum(df[df$CategoryD=='SPL003E', ]$TAF) +
                    sum(df[df$CategoryD=='SPL004E', ]$TAF) +
                    sum(df[df$CategoryD=='SPL005E', ]$TAF) +
                    sum(df[df$CategoryD=='SPL006E', ]$TAF) +
                    sum(df[df$CategoryD=='SPL010E',]$TAF) +
                    sum(df[df$CategoryD=='SPL011E',]$TAF) +
                    sum(df[df$CategoryD=='SPL012E',]$TAF) +
                    sum(df[df$CategoryD=='SPL013E',]$TAF) +
                    sum(df[df$CategoryD=='SPL014E',]$TAF) +
                    sum(df[df$CategoryD=='SPL015E',]$TAF) +
                    sum(df[df$CategoryD=='SPL016E',]$TAF) +
                    sum(df[df$CategoryD=='SPL017E',]$TAF) +
                    sum(df[df$CategoryD=='SPL018E',]$TAF) +
                    sum(df[df$CategoryD=='SPL019E',]$TAF)

EQ$SPLRDO =         sum(df[df$CategoryD=='SPL001F', ]$TAF) +
                    sum(df[df$CategoryD=='SPL002A6',]$TAF) +
                    sum(df[df$CategoryD=='SPL002B6',]$TAF) +
                    sum(df[df$CategoryD=='SPL002C6',]$TAF) +
                    sum(df[df$CategoryD=='SPL003F', ]$TAF) +
                    sum(df[df$CategoryD=='SPL004F', ]$TAF) +
                    sum(df[df$CategoryD=='SPL005F', ]$TAF) +
                    sum(df[df$CategoryD=='SPL006F', ]$TAF) +
                    sum(df[df$CategoryD=='SPL010F',]$TAF) +
                    sum(df[df$CategoryD=='SPL011F',]$TAF) +
                    sum(df[df$CategoryD=='SPL012F',]$TAF) +
                    sum(df[df$CategoryD=='SPL013F',]$TAF) +
                    sum(df[df$CategoryD=='SPL014F',]$TAF) +
                    sum(df[df$CategoryD=='SPL015F',]$TAF) +
                    sum(df[df$CategoryD=='SPL016F',]$TAF) +
                    sum(df[df$CategoryD=='SPL017F',]$TAF) +
                    sum(df[df$CategoryD=='SPL018F',]$TAF) +
                    sum(df[df$CategoryD=='SPL019F',]$TAF)
```

```
#
return (EQ)
}
```

5.2 Water Use: AWU, DEP, NWx

Listing 2: Second set of water use equations: derived quantities.

```
qc2320 = function(EQ, CV){

#EQ = df03
# ==========================================
# Input TAF should be >=0
# ==========================================
#
# ================================================================================
# Create dataframe for new rows
# ================================================================================
W                    = data.frame(CategoryA=character(), CategoryB=character(), CategoryC=character(),
                                  CategoryD=character(), TAF=double(), stringsAsFactors=FALSE)
W[1,c('CategoryB')]  = 'Computed'
W[1,c('CategoryC')]  = 'TBA'
WORK                 = subset(W, CategoryA != 'NULL')
#
# Ag
#
W$CategoryA = 'Agriculture';
W$CategoryD = 'AWUAG';      W$TAF   = EQ$AWUAG;      WORK = rbind(WORK, W)
W$CategoryD = 'DEPAG';      W$TAF   = EQ$DEPAG;      WORK = rbind(WORK, W)
W$CategoryD = 'NW001AG';    W$TAF   = EQ$NW001AG;    WORK = rbind(WORK, W)
W$CategoryD = 'NW002AG';    W$TAF   = EQ$NW002AG;    WORK = rbind(WORK, W)
W$CategoryD = 'DEPAGC';     W$TAF   = EQ$DEPAGC;     WORK = rbind(WORK, W)
W$CategoryD = 'NW001AGC';   W$TAF   = EQ$NW001AGC;   WORK = rbind(WORK, W)
W$CategoryD = 'NW002AGC';   W$TAF   = EQ$NW002AGC;   WORK = rbind(WORK, W)
W$CategoryD = 'AWUAGC';     W$TAF   = EQ$AWUAGC;     WORK = rbind(WORK, W)
#
# Urban
#
W$CategoryA = 'Urban'
```

```
W$CategoryD = 'AWUURB';     W$TAF  = EQ$AWUURB;     WORK = rbind(WORK, W)
W$CategoryD = 'NW001URB';   W$TAF  = EQ$NW001URB;   WORK = rbind(WORK, W)
W$CategoryD = 'DEPURB';     W$TAF  = EQ$DEPURB;     WORK = rbind(WORK, W)
W$CategoryD = 'NW002URB';   W$TAF  = EQ$NW002URB;   WORK = rbind(WORK, W)
W$CategoryD = 'AWUURBC';    W$TAF  = EQ$AWUURBC;    WORK = rbind(WORK, W)
W$CategoryD = 'NW001URBC';  W$TAF  = EQ$NW001URBC;  WORK = rbind(WORK, W)
W$CategoryD = 'NW002URBC';  W$TAF  = EQ$NW002URBC;  WORK = rbind(WORK, W)
W$CategoryD = 'DEPURBC';    W$TAF  = EQ$DEPURBC;    WORK = rbind(WORK, W)
#
# Managed Wetlands
#
W$CategoryA = 'Managed Wetlands'
W$CategoryD = 'AWUMW';      W$TAF  = EQ$AWUMW;      WORK = rbind(WORK, W)
W$CategoryD = 'NW001MW';    W$TAF  = EQ$NW001MW;    WORK = rbind(WORK, W)
W$CategoryD = 'DEPMW';      W$TAF  = EQ$DEPMW;      WORK = rbind(WORK, W)
W$CategoryD = 'NW002MW';    W$TAF  = EQ$NW002MW;    WORK = rbind(WORK, W)
W$CategoryD = 'AWUMWC';     W$TAF  = EQ$AWUMWC;     WORK = rbind(WORK, W)
W$CategoryD = 'NW001MWC';   W$TAF  = EQ$NW001MWC;   WORK = rbind(WORK, W)
W$CategoryD = 'NW002MWC';   W$TAF  = EQ$NW002MWC;   WORK = rbind(WORK, W)
W$CategoryD = 'DEPMWC';     W$TAF  = EQ$DEPMWC;     WORK = rbind(WORK, W)
#
# Instream Flow Requirements
#
W$CategoryA = 'Instream Flow Requirements'
W$CategoryD = 'AWUIFR';     W$TAF  = EQ$AWUIFR;     WORK = rbind(WORK, W)
W$CategoryD = 'NW001IFR';   W$TAF  = EQ$NW001IFR;   WORK = rbind(WORK, W)
W$CategoryD = 'DEPIFR';     W$TAF  = EQ$DEPIFR;     WORK = rbind(WORK, W)
W$CategoryD = 'NW002IFR';   W$TAF  = EQ$NW002IFR;   WORK = rbind(WORK, W)
#
# Wild Scenic Rivers
#
W$CategoryA = 'Wild and Scenic Rivers'
W$CategoryD = 'AWUWSR';     W$TAF  = EQ$AWUWSR;     WORK = rbind(WORK, W)
W$CategoryD = 'NW001WSR';   W$TAF  = EQ$NW001WSR;   WORK = rbind(WORK, W)
```

```
W$CategoryD = 'DEPWSR';    W$TAF    = EQ$DEPWSR;    WORK = rbind(WORK, W)
W$CategoryD = 'NW002WSR'; W$TAF    = EQ$NW002WSR; WORK = rbind(WORK, W)
#
# Required Delta Outflow
#
W$CategoryA = 'Required Delta Outflow'
W$CategoryD = 'AWURDO';    W$TAF    = EQ$AWURDO;    WORK = rbind(WORK, W)
W$CategoryD = 'NW001RDO'; W$TAF    = EQ$NW001RDO; WORK = rbind(WORK, W)
W$CategoryD = 'DEPRDO';    W$TAF    = EQ$DEPRDO;    WORK = rbind(WORK, W)
W$CategoryD = 'NW002RDO'; W$TAF    = EQ$NW002RDO; WORK = rbind(WORK, W)
#
#write.table(WORK, WORK_OUTPUT, sep=',', row.names=FALSE, quote=TRUE)
#==========================================================================
# Set CategoryC values for computed rows
#==========================================================================
#E        = read.table(WORK_OUTPUT, sep=',', header=TRUE, stringsAsFactors=FALSE)
E        = WORK
E_ROWS = dim(E)[1]
CV_ROWS= dim(CV)[1]
#
# Note the use of CategorD1 from CV global
#
for(ii in 1:CV_ROWS) {
          for (jj in 1:E_ROWS){
                    if (CV[ii,c('CategoryD1')]==E[jj,c('CategoryD')]) {
                              E[jj,c('CategoryC')]=as.character(CV[ii,c('CategoryC')])
                              next
     }
          }
}
#
return(E)
}
```

5.3 Water Supply Equations

Listing 3: First set of water supply equations.

```
qc2410 = function(df){
# ==========================================================================
# Water Supply Equations: Translation of TH formulas at DAUCO-level
# ==========================================================================
EQ = data.frame(ncols=1)
#
#browser()
# ==========================================================================
# Total Developed Supply
# ==========================================================================
EQ$TDS = sum(df[df$CategoryD=='SPL001A', ]$TAF) +
         sum(df[df$CategoryD=='SPL001B', ]$TAF) +
         sum(df[df$CategoryD=='SPL001C', ]$TAF) +
         sum(df[df$CategoryD=='SPL001D', ]$TAF) +
         sum(df[df$CategoryD=='SPL001E', ]$TAF) +
         sum(df[df$CategoryD=='SPL001F', ]$TAF) +
         sum(df[df$CategoryD=='SPL002A1', ]$TAF) +
         sum(df[df$CategoryD=='SPL002A2', ]$TAF) +
         sum(df[df$CategoryD=='SPL002A3', ]$TAF) +
         sum(df[df$CategoryD=='SPL002A4', ]$TAF) +
         sum(df[df$CategoryD=='SPL002A5', ]$TAF) +
         sum(df[df$CategoryD=='SPL002A6', ]$TAF) +
         sum(df[df$CategoryD=='SPL002B1', ]$TAF) +
         sum(df[df$CategoryD=='SPL002B2', ]$TAF) +
         sum(df[df$CategoryD=='SPL002B3', ]$TAF) +
         sum(df[df$CategoryD=='SPL002B4', ]$TAF) +
         sum(df[df$CategoryD=='SPL002B5', ]$TAF) +
         sum(df[df$CategoryD=='SPL002B6', ]$TAF) +
         sum(df[df$CategoryD=='SPL002C1', ]$TAF) +
         sum(df[df$CategoryD=='SPL002C2', ]$TAF) +
         sum(df[df$CategoryD=='SPL002C3', ]$TAF) +
```

```
sum(df[df$CategoryD=='SPL002C4', ]$TAF) +
sum(df[df$CategoryD=='SPL002C5', ]$TAF) +
sum(df[df$CategoryD=='SPL002C6', ]$TAF) +
sum(df[df$CategoryD=='SPL002D1', ]$TAF) +
sum(df[df$CategoryD=='SPL002D2', ]$TAF) +
sum(df[df$CategoryD=='SPL002D3', ]$TAF) +
sum(df[df$CategoryD=='SPL003A', ]$TAF) +
sum(df[df$CategoryD=='SPL003B', ]$TAF) +
sum(df[df$CategoryD=='SPL003C', ]$TAF) +
sum(df[df$CategoryD=='SPL003D', ]$TAF) +
sum(df[df$CategoryD=='SPL003E', ]$TAF) +
sum(df[df$CategoryD=='SPL003F', ]$TAF) +
sum(df[df$CategoryD=='SPL004A', ]$TAF) +
sum(df[df$CategoryD=='SPL004B', ]$TAF) +
sum(df[df$CategoryD=='SPL004C', ]$TAF) +
sum(df[df$CategoryD=='SPL004D', ]$TAF) +
sum(df[df$CategoryD=='SPL004E', ]$TAF) +
sum(df[df$CategoryD=='SPL004F', ]$TAF) +
sum(df[df$CategoryD=='SPL005A', ]$TAF) +
sum(df[df$CategoryD=='SPL005B', ]$TAF) +
sum(df[df$CategoryD=='SPL005C', ]$TAF) +
sum(df[df$CategoryD=='SPL005D', ]$TAF) +
sum(df[df$CategoryD=='SPL005E', ]$TAF) +
sum(df[df$CategoryD=='SPL005F', ]$TAF) +
sum(df[df$CategoryD=='SPL006A', ]$TAF) +
sum(df[df$CategoryD=='SPL006B', ]$TAF) +
sum(df[df$CategoryD=='SPL006C', ]$TAF) +
sum(df[df$CategoryD=='SPL006D', ]$TAF) +
sum(df[df$CategoryD=='SPL006E', ]$TAF) +
sum(df[df$CategoryD=='SPL006F', ]$TAF) +
sum(df[df$CategoryD=='SPL010A', ]$TAF) +
sum(df[df$CategoryD=='SPL010B', ]$TAF) +
sum(df[df$CategoryD=='SPL010C', ]$TAF) +
sum(df[df$CategoryD=='SPL010D', ]$TAF) +
```

```
sum(df[df$CategoryD=='SPL011A', ]$TAF) +
sum(df[df$CategoryD=='SPL011B', ]$TAF) +
sum(df[df$CategoryD=='SPL011C', ]$TAF) +
sum(df[df$CategoryD=='SPL011D', ]$TAF) +
sum(df[df$CategoryD=='SPL011E', ]$TAF) +
sum(df[df$CategoryD=='SPL011F', ]$TAF) +
sum(df[df$CategoryD=='SPL012A', ]$TAF) +
sum(df[df$CategoryD=='SPL012B', ]$TAF) +
sum(df[df$CategoryD=='SPL012C', ]$TAF) +
sum(df[df$CategoryD=='SPL012D', ]$TAF) +
sum(df[df$CategoryD=='SPL012E', ]$TAF) +
sum(df[df$CategoryD=='SPL012F', ]$TAF) +
sum(df[df$CategoryD=='SPL013A', ]$TAF) +
sum(df[df$CategoryD=='SPL013B', ]$TAF) +
sum(df[df$CategoryD=='SPL013C', ]$TAF) +
sum(df[df$CategoryD=='SPL013D', ]$TAF) +
sum(df[df$CategoryD=='SPL013E', ]$TAF) +
sum(df[df$CategoryD=='SPL013F', ]$TAF) +
sum(df[df$CategoryD=='SPL014A', ]$TAF) +
sum(df[df$CategoryD=='SPL014B', ]$TAF) +
sum(df[df$CategoryD=='SPL014C', ]$TAF) +
sum(df[df$CategoryD=='SPL014D', ]$TAF) +
sum(df[df$CategoryD=='SPL014E', ]$TAF) +
sum(df[df$CategoryD=='SPL014F', ]$TAF) +
sum(df[df$CategoryD=='SPL015A', ]$TAF) +
sum(df[df$CategoryD=='SPL015B', ]$TAF) +
sum(df[df$CategoryD=='SPL015C', ]$TAF) +
sum(df[df$CategoryD=='SPL015D', ]$TAF) +
sum(df[df$CategoryD=='SPL015E', ]$TAF) +
sum(df[df$CategoryD=='SPL015F', ]$TAF) +
sum(df[df$CategoryD=='SPL016A', ]$TAF) +
sum(df[df$CategoryD=='SPL016B', ]$TAF) +
sum(df[df$CategoryD=='SPL016C', ]$TAF) +
sum(df[df$CategoryD=='SPL016D', ]$TAF) +
```

```
            sum(df[df$CategoryD=='SPL016E', ]$TAF) +
            sum(df[df$CategoryD=='SPL016F', ]$TAF) +
            sum(df[df$CategoryD=='SPL017A', ]$TAF) +
            sum(df[df$CategoryD=='SPL017B', ]$TAF) +
            sum(df[df$CategoryD=='SPL017C', ]$TAF) +
            sum(df[df$CategoryD=='SPL017D', ]$TAF) +
            sum(df[df$CategoryD=='SPL017E', ]$TAF) +
            sum(df[df$CategoryD=='SPL017F', ]$TAF) +
            sum(df[df$CategoryD=='SPL018A', ]$TAF) +
            sum(df[df$CategoryD=='SPL018B', ]$TAF) +
            sum(df[df$CategoryD=='SPL018C', ]$TAF) +
            sum(df[df$CategoryD=='SPL018D', ]$TAF) +
            sum(df[df$CategoryD=='SPL018E', ]$TAF) +
            sum(df[df$CategoryD=='SPL018F', ]$TAF) +
            sum(df[df$CategoryD=='SPL019A', ]$TAF) +
            sum(df[df$CategoryD=='SPL019B', ]$TAF) +
            sum(df[df$CategoryD=='SPL019C', ]$TAF) +
            sum(df[df$CategoryD=='SPL019D', ]$TAF) +
            sum(df[df$CategoryD=='SPL019E', ]$TAF) +
            sum(df[df$CategoryD=='SPL019F', ]$TAF)
# ================================================================
# Total Return Flow and Reuse
# ================================================================
EQ$TRFR = sum(df[df$CategoryD=='AG008',    ]$TAF) +
          sum(df[df$CategoryD=='AG021',   ]$TAF) +
          sum(df[df$CategoryD=='URB015A', ]$TAF) +
          sum(df[df$CategoryD=='URB015B', ]$TAF) +
          sum(df[df$CategoryD=='URB015C', ]$TAF) +
          sum(df[df$CategoryD=='URB029',  ]$TAF) +
          sum(df[df$CategoryD=='MW006',    ]$TAF) +
          sum(df[df$CategoryD=='MW019',   ]$TAF) +
          sum(df[df$CategoryD=='IFR002',   ]$TAF) +
          sum(df[df$CategoryD=='WSR002',   ]$TAF)
#
```

```
# ==================================================================
# Total Supply and Reuse
# ==================================================================
EQ$TSR =  EQ$TDS + EQ$TRFR
#
# ==================================================================
# Total Reuse of Deep Percolation
# ==================================================================
EQ$TRDP = sum(df[df$CategoryD=='AG005',   ]$TAF) +
          sum(df[df$CategoryD=='AG007',   ]$TAF) +
          sum(df[df$CategoryD=='AG022',  ]$TAF) +
          sum(df[df$CategoryD=='URB012',]$TAF) +
          sum(df[df$CategoryD=='URB014',]$TAF) +
          sum(df[df$CategoryD=='URB030',]$TAF) +
          sum(df[df$CategoryD=='MW003',   ]$TAF) +
          sum(df[df$CategoryD=='MW005',   ]$TAF) +
          sum(df[df$CategoryD=='MW020',  ]$TAF)
#
# ==================================================================
# Total Net Supply
# ==================================================================
EQ$TNS = EQ$TDS - EQ$TRDP
#
# ==================================================================
# Total Reuse
# ==================================================================
EQ$TR    = EQ$TRFR + EQ$TRDP
#
    return(EQ)
}
```

5.4 Water Supply Derived Values: TDS,TRFR,TSR,TRDP,TNS,TR

Listing 4: Second set of water supply equations: derived quantities.

```
qc2420 = function(EQ, CV){
# ========================================
# Input TAF should be >=0
# ========================================
#
# ========================================================================
# Create dataframe for new rows
# ========================================================================
W = data.frame(CategoryA=character(), CategoryB=character(), CategoryC=character(),
               CategoryD=character(), TAF=double(),          stringsAsFactors=FALSE)
#
W[1,c('CategoryB')]   = 'Computed'
W[1,c('CategoryC')]   = 'TBD'
#
WORK                  = subset(W, CategoryA != 'NULL')
W$CategoryA           = 'Water Supplies'
#
# TDS,TRFR,TSR,TRDP,TNS,TR
#
W$CategoryD = 'SPL023'; W$TAF = EQ$TDS;    WORK = rbind(WORK, W)
W$CategoryD = 'SPL024'; W$TAF = EQ$TRFR;   WORK = rbind(WORK, W)
W$CategoryD = 'SPL025'; W$TAF = EQ$TSR;    WORK = rbind(WORK, W)
W$CategoryD = 'SPL026'; W$TAF = EQ$TRDP;   WORK = rbind(WORK, W)
W$CategoryD = 'SPL027'; W$TAF = EQ$TNS;    WORK = rbind(WORK, W)
W$CategoryD = 'SPL028'; W$TAF = EQ$TR;     WORK = rbind(WORK, W)
#=========================================================================
# Set CategoryC values for computed rows
# NOTE: Use of CV$D1
#=========================================================================
E         = WORK
E_ROWS    = dim(E)[1]
```

```
CV_ROWS        = dim(CV)[1]
#
for(i in 1:CV_ROWS) {
        for (j in 1:E_ROWS){
                if (CV[i,]$CategoryD1 == E[j,]$CategoryD) {
                        E[j,]$CategoryC = CV[i,]$CategoryC
                        next
    }
        }
}
return(E)
}
```

5.5 Table02 Equations

Appendix A Data Errata

1. 2023-12-12: (Jennifer Stricklin and John Helly) For HR Central Coast 2003, the AWU, NWU, and DEP (Table 2) are out of balance by 3.7 TAF due to an error in the Level0 spreadsheet at the HR summary column, cell J315 for CVP Deliveries, Urban (SPL14C). The erroneous equation is =H315-H215 and should have been =H315. Error found in filename 2003_Data_Entry_9-13-16final.xls which is/was compiled at DWR headquarters from RO spreadsheets. Historically, DWR headquarters balanced the hydrologic regions (typically using reuse categories), we have now moved to Regional Offices balancing hydrologic regions, which if done in 2003 would have likely caught this error. This error is not in the DAUCO data, it is in the summary equations for CC HR only, cell J315 in the CD_Data_Entry_CC sheet (CD or Central District, now North Central Regional Office). It creates an *off-balance* amount of 3.7 TAF in the HR and likely in the ST balances.

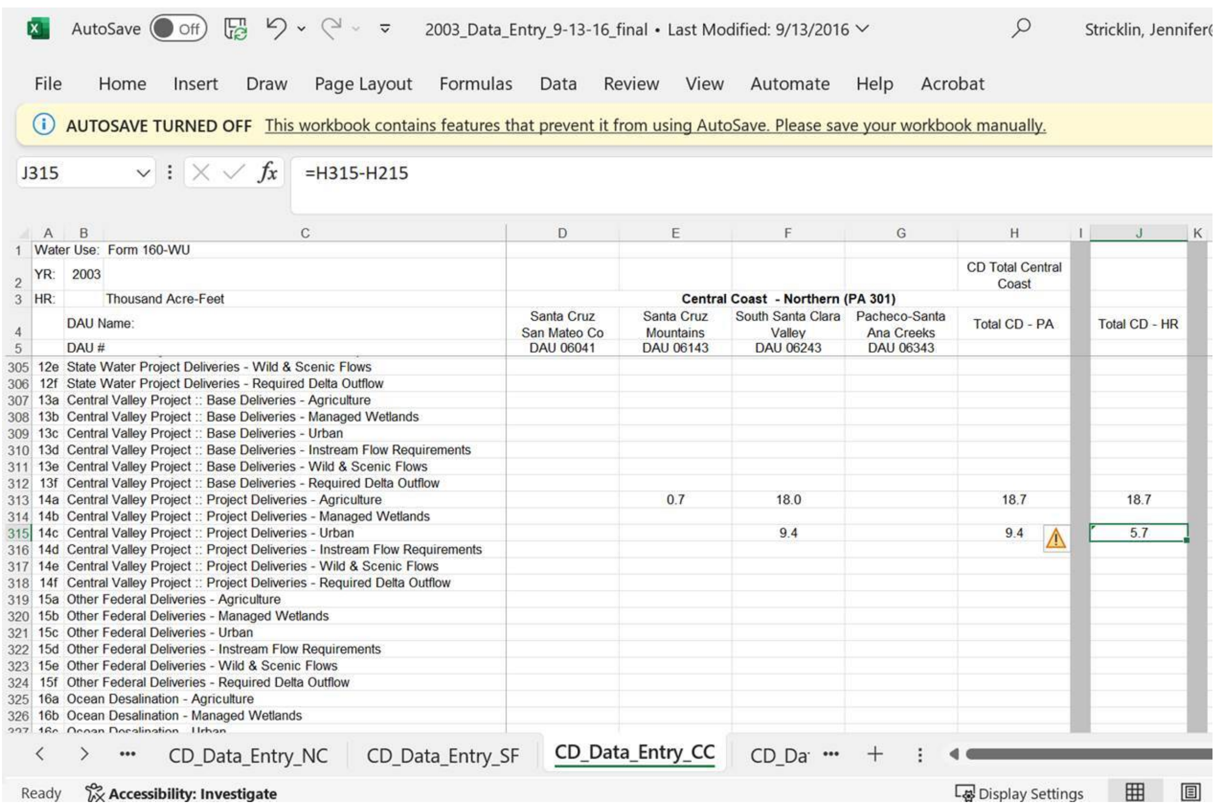
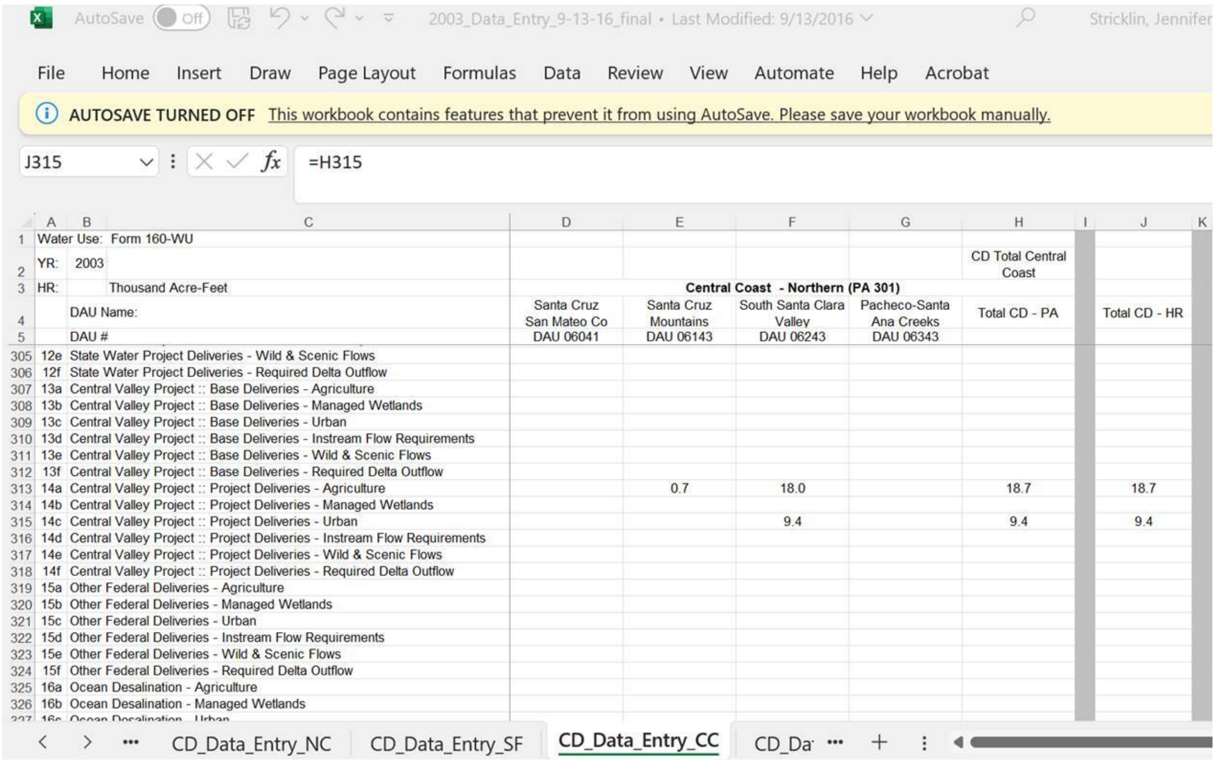


Figure 6: Data error in spreadsheet (1/2).



AutoSave Off 2003_Data_Entry_9-13-16_final • Last Modified: 9/13/2016 Stricklin, Jennifer

File Home Insert Draw Page Layout Formulas Data Review View Automate Help Acrobat

AUTOSAVE TURNED OFF This workbook contains features that prevent it from using AutoSave. Please save your workbook manually.

J315 =H315

	A	B	C	D	E	F	G	H	I	J
1	Water Use:	Form 160-WU								
2	YR:	2003						CD Total Central Coast		
3	HR:		Thousand Acre-Feet	Central Coast - Northern (PA 301)						
4		DAU Name:		Santa Cruz San Mateo Co	Santa Cruz Mountains	South Santa Clara Valley	Pacheco-Santa Ana Creeks	Total CD - PA		Total CD - HR
5		DAU #		DAU 06041	DAU 06143	DAU 06243	DAU 06343			
305	12e	State Water Project Deliveries - Wild & Scenic Flows								
306	12f	State Water Project Deliveries - Required Delta Outflow								
307	13a	Central Valley Project :: Base Deliveries - Agriculture								
308	13b	Central Valley Project :: Base Deliveries - Managed Wetlands								
309	13c	Central Valley Project :: Base Deliveries - Urban								
310	13d	Central Valley Project :: Base Deliveries - Instream Flow Requirements								
311	13e	Central Valley Project :: Base Deliveries - Wild & Scenic Flows								
312	13f	Central Valley Project :: Base Deliveries - Required Delta Outflow								
313	14a	Central Valley Project :: Project Deliveries - Agriculture			0.7	18.0		18.7		18.7
314	14b	Central Valley Project :: Project Deliveries - Managed Wetlands								
315	14c	Central Valley Project :: Project Deliveries - Urban				9.4		9.4		9.4
316	14d	Central Valley Project :: Project Deliveries - Instream Flow Requirements								
317	14e	Central Valley Project :: Project Deliveries - Wild & Scenic Flows								
318	14f	Central Valley Project :: Project Deliveries - Required Delta Outflow								
319	15a	Other Federal Deliveries - Agriculture								
320	15b	Other Federal Deliveries - Managed Wetlands								
321	15c	Other Federal Deliveries - Urban								
322	15d	Other Federal Deliveries - Instream Flow Requirements								
323	15e	Other Federal Deliveries - Wild & Scenic Flows								
324	15f	Other Federal Deliveries - Required Delta Outflow								
325	16a	Ocean Desalination - Agriculture								
326	16b	Ocean Desalination - Managed Wetlands								

CD_Data_Entry_NC CD_Data_Entry_SF CD_Data_Entry_CC CD_Da

Figure 7: Data error in spreadsheet (2/2).

Glossary - Water Plan

A

acre-foot The volume of water that would cover 1 acre to a depth of 1 foot; equal to 43,560 cubic feet or 325,851 gallons.

adjudicated A judicial determination of water rights for a stream or groundwater basin, or parts of those waters. In the context of an adjudicated groundwater basin, landowners or other parties have turned to the courts to settle disputes over how much groundwater can be extracted by each party to the decision. , 52

applied water The total amount of water diverted from any source and applied to meet the uses of urban and agricultural sectors and dedicated to the environment, including water applied for groundwater recharge. Applied water is the quantity of water delivered to the intake to a city water system, a factory, or a farm headgate, either directly or by incidental flows to a marsh or wetland for wildlife areas. For existing instream use, applied water is the portion of the streamflow dedicated to instream use or reserved under the federal or State Wild and Scenic Rivers acts, or the flow needed to meet required standards in the Sacramento-San Joaquin Delta. Applied water includes consumptive use, reuse, and outflows. Applied water includes all sources of supply (surface water, groundwater, reuse, and recycled water). Agriculture - [AWUAG] Applied Water Use Managed Wetlands - [AWUMW] Applied Water Use Urban - [AWUURB] Applied Water Use Instream Flow Requirements - [AWUIFR] Applied Water Use Wild and Scenic Rivers - [AWUWSR] Applied Water Use Required Delta Outflow - [AWURDO] Applied Water Use , 47, 48, 49, 50, 54

B

beneficial use (1) As part of the nine regional water quality control boards' basin planning efforts, as many as 25 water-quality beneficial use categories for water have been identified. Most are for human and instream uses. From Section 13050(f) of California's Porter-Cologne Water Quality Control Act: 'Beneficial uses' of the waters of the state that may be protected against water quality degradation include, but are not necessarily limited to, domestic, municipal, agricultural, and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. (2) As part of the State Water Resources Control Board's water rights program, the California Water Code Section 1240 states, The appropriation must be for some useful or beneficial purpose, and when the appropriator or his successor in interest ceases to use it for such a purpose (typically five years or greater) the right ceases. In the water rights process, beneficial uses are defined in the California Code of Regulations. Categories of beneficial uses recognized in California include aquaculture, domestic, fire protection, fish and wildlife, frost protection, heat control, industrial use, mining, municipal, power, recreation, stockwatering, and water quality control.

brackish water Water with a salinity that exceeds normally acceptable standards for municipal, domestic, and irrigation uses but has less salinity than seawater.

C

Central Valley Project - base The delivery of prior rights water to Central Valley Project base or settlement contractors. Water Supplies - [SPL013A] Central Valley Project - Base Deliveries - Agriculture Water Supplies - [SPL013B] Central Valley Project - Base Deliveries - Managed Wetlands Water Supplies - [SPL013C] Central Valley Project - Base Deliveries - Urban Water Supplies - [SPL013D] Central Valley Project - Base Deliveries - Instream Flow Requirements Water Supplies - [SPL013E]

Central Valley Project - Base Deliveries - Wild and Scenic Rivers Water Supplies - [SPL013F] Central Valley Project - Base Deliveries - Required Delta Outflow

Central Valley Project - project The delivery of non-prior rights water to Central Valley Project contractors. Water Supplies - [SPL014A] Central Valley Project - Project Deliveries - Agriculture Water Supplies - [SPL014B] Central Valley Project - Project Deliveries - Managed Wetlands Water Supplies - [SPL014C] Central Valley Project - Project Deliveries - Urban Water Supplies - [SPL014D] Central Valley Project - Project Deliveries - Instream Flow Requirements Water Supplies - [SPL014E] Central Valley Project - Project Deliveries - Wild and Scenic Rivers Water Supplies - [SPL014F] Central Valley Project - Project Deliveries - Required Delta Outflow

Colorado River deliveries The volume of water diverted from the mainstem Colorado River by Metropolitan Water District of Southern California, Imperial Irrigation District, Coachella Valley Water District, the Yuma Project, and others under California's consumptive use entitlement to use Colorado River water. Water Supplies - [SPL011A] Colorado River Deliveries - Agriculture Water Supplies - [SPL011B] Colorado River Deliveries - Managed Wetlands Water Supplies - [SPL011C] Colorado River Deliveries - Urban Water Supplies - [SPL011D] Colorado River Deliveries - Instream Flow Requirements Water Supplies - [SPL011E] Colorado River Deliveries - Wild and Scenic Rivers Water Supplies - [SPL011F] Colorado River Deliveries - Required Delta Outflow

C

consumptive water use The amount of water used and not available for reuse as a source of supply. It includes water that evaporates, transpires, or is incorporated into products, plant tissue, or animal tissue.

conveyance A structure, either natural or human-made, that provides for the movement of water. Conveyance infrastructures include natural watercourses, such as streams, rivers, and groundwater aquifers; and constructed facilities, such as canals and pipelines, including control structures such as weirs. Conveyance facilities range in size from small, local, end-user distribution systems to large systems that deliver water to, or drain, areas as large as multiple hydrologic regions. Conveyance facilities may also require associated infrastructure, such as pumping plants and power supply, diversion structures, fish ladders, and fish screens. Agriculture - [AG018A] Conveyance Return Flow to Oregon Agriculture - [AG018B] Conveyance Return Flow to Nevada Agriculture - [AG018C] Conveyance Return Flow to Mexico Agriculture - [AG018D] Conveyance Deep Percolation to Oregon Agriculture - [AG018E] Conveyance Deep Percolation to Nevada Agriculture - [AG018F] Conveyance Deep Percolation to Mexico Agriculture - [AG019A] Conveyance Return Flows to Salt Sink Agriculture - [AG019B] Conveyance Return Flow for Delta Outflow Agriculture - [AG022] Conveyance Deep Percolation Agriculture - [AG023] Conveyance Deep Percolation to Salt Sink Managed Wetlands - [MW016A] Conveyance Return Flow to Oregon Managed Wetlands - [MW016B] Conveyance Return Flow to Nevada Managed Wetlands - [MW016C] Conveyance Return Flow to Mexico Managed Wetlands - [MW016D] Conveyance Deep Percolation to Oregon Managed Wetlands - [MW016E] Conveyance Deep Percolation to Nevada Managed Wetlands - [MW016F] Conveyance Deep Percolation to Mexico Managed Wetlands - [MW017B] Conveyance Return Flow for Delta Outflow Urban - [URB026A] Conveyance Return Flow to Oregon Urban - [URB026B] Conveyance Return Flow to Nevada Urban - [URB026C] Conveyance Return Flow to Mexico Urban - [URB026D] Conveyance Deep Percolation to Oregon Urban - [URB026E] Conveyance Deep Percolation to Nevada Urban - [URB026F] Conveyance Deep Percolation to Mexico Urban - [URB027B] Conveyance Return Flow for Delta Outflow , 47, 49, 50

conveyance applied water The amount of applied water used to convey water from the source to the use (e.g., if 200 acre-feet is diverted into a canal and 180 acre-feet arrive at its place of use, then 20 acre- feet is the amount of conveyance applied water). This includes water that is both recoverable (outflows such as seepage and deep percolation) and irrecoverable (depletions such as evapotranspiration, evaporation, or deep percolation to a salt sink). Agriculture - [AWUAGC] Conveyance Applied Water Use Managed Wetlands - [AWUMWC] Conveyance Applied Water Use Urban - [AWUURBC] Conveyance Applied Water Use

conveyance evaporation and evapotranspiration The water evaporated into the atmosphere from conveyance systems and evapotranspired by vegetation in and near a conveyance. Agriculture - [AG017] Conveyance Evaporation and ETAW Managed Wetlands - [MW015] Conveyance Evaporation and ETAW Urban - [URB025] Conveyance Evaporation and ETAW

conveyance return flows to developed supply The portion of conveyance water that seeps through channels and returns as surface flow in another area. Agriculture - [AG020A] Conveyance Return Flow to Developed Supply (Other DAUCO within PA) Agriculture - [AG020B] Conveyance Return Flow to Developed Supply (Other PA) Agriculture - [AG020C] Conveyance Return Flow to Developed Supply (Other Region) Managed Wetlands - [MW018A] Conveyance Return Flow to Developed Supply (Other DAUCO within PA) Managed Wetlands - [MW018B] Conveyance Return Flow to Developed Supply (Other PA) Managed Wetlands - [MW018C] Conveyance Return Flow to Developed Supply (Other Region) Urban - [URB028A] Conveyance Return Flow to Developed Supply (Other DAUCO within PA) Urban - [URB028B] Conveyance Return Flow to Developed Supply (Other PA) Urban - [URB028C] Conveyance Return Flow to Developed Supply (Other Region)

conveyance seepage The portion of conveyance water that seeps through channels and is consumed by other uses instead of returning to surface water or groundwater. Agriculture - [AG021] Conveyance Seepage Managed Wetlands - [MW019] Conveyance Seepage Urban - [URB029] Conveyance Seepage , 47, 49, 51

crop production applied water The portion of agriculture applied water for crop production and farming practices (e.g. rice decomposition, salt leaching, and front protection). This doesn't include groundwater recharge applied water or conveyance applied water. Agriculture - [AG001] Applied Water - Crop Production

D

dedicated and developed water supplies Water provided for urban and agricultural uses and dedicated to the environment. Sources of supply include surface water, groundwater, reuse, and recycled water. In any year, some of the dedicated supply includes water that is used multiple times (reuse) and water held in storage from previous years. On average, this equals 40 percent to 50 percent of precipitation.

deep percolation Vertical movement or percolation of water through the ground and beyond the lower limit of the root zone of plants into the groundwater. Agriculture - [AG009D] Deep Percolation to Oregon Agriculture - [AG009E] Deep Percolation to Nevada Agriculture - [AG009F] Deep Percolation to Mexico Agriculture - [AG018D] Conveyance Deep Percolation to Oregon Agriculture - [AG018E] Conveyance Deep Percolation to Nevada Agriculture - [AG018F] Conveyance Deep Percolation to Mexico Agriculture - [AG022] Conveyance Deep Percolation Managed Wetlands - [MW007D] Deep Percolation to Oregon Managed Wetlands - [MW007E] Deep Percolation to Nevada Managed Wetlands - [MW007F] Deep Percolation to Mexico Managed Wetlands - [MW016D] Conveyance Deep Percolation to Oregon Managed Wetlands - [MW016E] Conveyance Deep Percolation to Nevada Managed Wetlands - [MW016F] Conveyance Deep Percolation to Mexico Managed Wetlands - [MW020] Conveyance Deep Percolation Urban - [URB017D] Deep Percolation to Oregon Urban - [URB017E] Deep Percolation to Nevada Urban - [URB017F]

Deep Percolation to Mexico Urban - [URB026D] Conveyance Deep Percolation to Oregon Urban - [URB026E] Conveyance Deep Percolation to Nevada Urban - [URB026F] Conveyance Deep Percolation to Mexico Urban - [URB030] Conveyance Deep Percolation , 47, 48, 49, 50, 51

deep percolation of applied water The portion of applied water that flows or percolates to groundwater. Agriculture - [AG005] Deep Percolation of Applied Water Managed Wetlands - [MW003] Deep Percolation of Applied Water Urban - [URB012] Deep Percolation of Applied Water , 47, 48, 50

deep percolation of applied water to salt sink The portion of applied water that flows or percolates to a salt sink. Agriculture - [AG006] Deep Percolation of Applied Water to Salt Sink Managed Wetlands - [MW004] Deep Percolation of Applied Water to Salt Sink Urban - [URB013] Deep Percolation of Applied Water to Salt Sink Agriculture - [AG023] Conveyance Deep Percolation to Salt Sink Managed Wetlands - [MW021] Conveyance Deep Percolation to Salt Sink Urban - [URB031] Conveyance Deep Percolation to Salt Sink , 47, 48, 49, 50, 51

deep percolation of water for groundwater recharge Deep percolation of water for managed recharge. Agriculture - [AG007] Deep Percolation of Groundwater Recharge Managed Wetlands - [MW005] Deep Percolation of Groundwater Recharge Urban - [URB014] Deep Percolation of Groundwater Recharge

D

Delta outflow Freshwater outflow from the Sacramento-San Joaquin Delta. Agriculture - [AG010B] Return Flow for Delta Outflow Agriculture - [AG019B] Conveyance Return Flow for Delta Outflow Managed Wetlands - [MW017B] Conveyance Return Flow for Delta Outflow Required Delta Outflow - [RDO002] Return Flow for Delta Outflow Urban - [URB018B] Return Flow for Delta Outflow Urban - [URB027B] Conveyance Return Flow for Delta Outflow , 47, 49, 50

D

depletion The quantity of water consumed within a spatial unit and no longer available as a source of supply. Depletion includes evaporation, evapotranspiration, and outflows to a salt sink or out of state. Agriculture - [DEPAG] Depletion Agriculture - [DEPAGC] Conveyance Depletion Urban - [DEPURB] Depletion Urban - [DEPURBC] Conveyance Depletion Managed Wetlands - [DEPMW] Depletion Managed Wetlands - [DEPMWC] Conveyance Depletion Instream Flow Requirements - [DEPIFR] Depletion Wild and Scenic Rivers - [DEPWSR] Depletion Required Delta Outflow - [DEPRDO] Depletion , 48, 49, 54

desalination A treatment process to remove salts from water to produce a water of lesser salinity than the source water. Water Supplies - [SPL016A] Ocean Desalination - Agriculture Water Supplies - [SPL016B] Ocean Desalination - Managed Wetlands Water Supplies - [SPL016C] Ocean Desalination - Urban Water Supplies - [SPL016D] Ocean Desalination - Instream Flow Requirements Water Supplies - [SPL016E] Ocean Desalination - Wild and Scenic Rivers Water Supplies - [SPL016F] Ocean Desalination - Required Delta Outflow Water Supplies - [SPL010A] Desalination - Urban Water Supplies - [SPL010B] Desalination - Instream Flow Requirements Water Supplies - [SPL010C] Desalination - Wild and Scenic Rivers Water Supplies - [SPL010D] Desalination - Required Delta Outflow , 50, 52, 53

detailed analysis unit A subsection of a planning area generally defined by hydrologic features or boundaries of organized water service agencies. The smallest hydrologic study area for the analysis of water supply and use balances by the California Water Plan. DAUs are often split by county, so the smallest spatial unit used in water balances is DAU by county (DAUCO). Many planning studies begin at the DAUCO, DAU, or planning area level, depending on available data. The results are aggregated to county or hydrologic region for presentation.

E

effective precipitation That portion of precipitation stored in the root zone that is available for plant evapotranspiration. It includes precipitation stored in the soil before and during the growing season. It is sometimes referred to as consumptive use of precipitation.

evaporation The process of liquid water becoming water vapor, including vaporization from water surfaces, land surfaces, and snow fields, but not from leaf surfaces.

evaporation and evapotranspiration of wastewater Amount of evaporation or evapotranspiration that occurs during the process or treatment of wastewater at the treatment plant. Urban - [URB016] Evaporation and Evapotranspiration of Wastewater

evapotranspiration The amount of water transpired by plants, retained in plant tissues, and evaporated from plant tissues and surrounding soil surfaces.

evapotranspiration of applied water The amount of consumptive use by crops, landscapes, or other vegetation. ETAW is the portion of evapotranspiration that was provided by applied water. Agriculture - [AG003] Evapotranspiration of Applied Water Managed Wetlands - [MW002] Evapotranspiration of Applied Water Urban - [URB010] Evapotranspiration of Applied Water

excess Delta outflow The freshwater outflow from the Sacramento-San Joaquin Delta that exceeds the amount required by law.

F

federal projects The Central Valley Project and other federal water projects. Other federal projects include: Black Butte, Klamath project, Solano project, New Hogan Reservoir, Salinas Dam, Cachuma project, Santa Maria project, and Carbon Canyon Reservoir.

flow diagram A diagram that characterizes a region's hydrologic cycle by documenting sources of water, such as precipitation and inflows, and tracks the water as it flows (through many different uses) to its ultimate destinations.

flow diagram table An itemized listing of all the categories contained in a flow diagram organized by inputs and withdrawals.

G

groundwater Water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water but does not include water that flows in known and definite channels. , 50

groundwater banking The storage of water via infiltration or injection into the groundwater basins during wet periods. Groundwater banking is a useful management tool that has been used for supply augmentation, water supply reliability, dry year supply, aquifer replenishment, environmental benefits, and water markets.

groundwater basin An alluvial aquifer or a stacked series of alluvial aquifers with reasonably well- defined boundaries in a lateral direction and having a definable bottom.

groundwater extractions-adjudicated The amount of water withdrawn from basins that have been adjudicated from the beginning of the water year to the end of the water year. Water Supplies - [SPL005A] Groundwater Extraction - Adjudicated - Agriculture Water Supplies - [SPL005B] Groundwater Extraction - Adjudicated - Managed Wetlands Water Supplies - [SPL005C] Groundwater Extraction - Adjudicated - Urban Water Supplies - [SPL005D] Groundwater Extraction - Adjudicated - Instream Flow Requirements Water Supplies - [SPL005E] Groundwater Extraction - Adjudicated - Wild and Scenic Rivers Water Supplies - [SPL005F] Groundwater Extraction - Adjudicated - Required Delta Outflow

groundwater extractions-banked The amount of water withdrawn from formal interagency contract banking programs during a water year. Water Supplies - [SPL006A] Groundwater Extraction - Banked - Agriculture Water Supplies - [SPL006B] Groundwater Extraction - Banked - Managed Wetlands Water Supplies - [SPL006C] Groundwater Extraction - Banked - Urban Water Supplies - [SPL006D] Groundwater Extraction - Banked - Instream Flow Requirements Water Supplies - [SPL006E] Groundwater Extraction - Banked - Wild and Scenic Rivers Water Supplies - [SPL006F] Groundwater Extraction - Banked - Required Delta Outflow

groundwater extractions-unadjudicated The amount of water withdrawn during a water year from basins or fractured bedrock that are not adjudicated or part of a contract banking program. Water Supplies - [SPL004A] Groundwater Extraction - Unadjudicated - Agriculture Water Supplies - [SPL004B] Groundwater Extraction - Unadjudicated - Managed Wetlands Water Supplies - [SPL004C] Groundwater Extraction - Unadjudicated - Urban Water Supplies - [SPL004D] Groundwater Extraction - Unadjudicated - Instream Flow Requirements Water Supplies - [SPL004E] Groundwater Extraction - Unadjudicated - Wild and Scenic Rivers Water Supplies - [SPL004F] Groundwater Extraction - Unadjudicated - Required Delta Outflow

groundwater overdraft The condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which water supply conditions approximate average conditions.

groundwater recharge The augmentation of groundwater, by natural or artificial means. , 47

groundwater recharge-adjudicated The amount of water recharged into groundwater basins that have been adjudicated by a court of law.

groundwater recharge applied water The volume of applied water that is intentionally recharged into an aquifer for storage. Agriculture - [AG002] Applied Water - Groundwater Recharge Urban - [URB009] Applied Water - Groundwater

groundwater recharge-banked The amount of water recharged into groundwater basins under formal contract banking programs.

groundwater recharge evaporation and evapotranspiration The amount of evaporation and evapotranspiration occurring from intentional groundwater recharge. Agriculture - [AG004] Evaporation and Evapotranspiration of Groundwater Recharge Urban - [URB011] Evaporation and Evapotranspiration of Groundwater Recharge

groundwater recharge-unadjudicated The amount of water recharged into groundwater basins that are neither adjudicated nor part of formal contract banking programs.

H

hydrologic region A geographical division of the state based on the local hydrologic basins. The California Department of Water Resources divides California into 10 hydrologic regions that correspond to the state's major water drainage basins: North Coast, North Lahontan, Sacramento River, San Francisco Bay, Central Coast, San Joaquin River, Tulare Lake, South Coast, South Lahontan, and Colorado River.

hydrologic unit The United States is divided and subdivided into successively smaller hydrologic units, which are classified into four levels: regions, subregions, accounting units, and cataloging units. The hydrologic units are arranged within each other, from the smallest (cataloging units) to the largest (regions). Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of two to eight digits, based on the four levels of classification in the hydrologic unit system.

hydrology A science related to the occurrence and distribution of natural water on Earth, including the annual volume and the monthly timing of runoff.

I

inflow from Mexico This represents the New River and Alamo River inflows from Mexico.

inflow from Oregon This represents the Klamath River inflow from Oregon.

instream environmental The portion of stream water dedicated for instream flow requirements, Wild and Scenic Rivers, and minimum required Delta outflow. Water Supplies - [SPL003D] Local Imports - Instream Flow Requirements Water Supplies - [SPL003E] Local Imports - Wild and Scenic Rivers Water Supplies - [SPL003F] Local Imports - Required Delta Outflow

instream flow requirements The amount of water within its natural watercourse as specified in an agreement, water rights permit, court order, Federal Energy Regulatory Commission license, etc., to support natural ecosystems; create habitat for plants and animals; and may provide additional benefits, such as recreation. , 51, 52, 53, 54

instream uses The beneficial uses of water within a stream or river without diversion from the stream.

irrecoverable water The amount of water that flows or percolates to a salt sink, is used by the growth process of plants (evapotranspiration), or evaporates from a conveyance facility or drainage canal.

L

local imports The amount of water conveyed by local agencies from other regions, where the agency has the water rights and also pays for the infrastructure and/or conveyance of the water across regions. Also referred to as local imported deliveries. Water Supplies - [SPL003A] Local Imports - Agriculture Water Supplies - [SPL003B] Local Imports - Managed Wetlands Water Supplies - [SPL003C] Local Imports - Urban Water Supplies - [SPL003D] Local Imports - Instream Flow Requirements Water Supplies - [SPL003E] Local Imports - Wild and Scenic Rivers Water Supplies - [SPL003F] Local Imports - Required Delta Outflow , 52

local projects The amount of water from local water storage facilities.

local supplies The amount of water delivered by local water agencies and individuals. It includes direct deliveries of water from streamflows and local water-storage facilities. It also includes water supply that remains in the stream for instream requirements and Wild and Scenic rivers. Also referred to as local deliveries or local surface water. Water Supplies - [SPL001A] Local Supplies - Agriculture Water Supplies - [SPL001B] Local Supplies - Managed Wetlands Water Supplies - [SPL001C] Local Supplies - Urban Water Supplies - [SPL001D] Local Supplies - Instream Flow Requirements Water Supplies - [SPL001E] Local Supplies - Wild and Scenic Rivers Water Supplies - [SPL001F] Local Supplies - Required Delta Outflow , 51

M

managed wetlands Impounded freshwater and nontidal brackish water wetlands. , 51, 52, 53, 54

minimum required Delta outflow The minimum volume of freshwater outflow from the Sacramento- San Joaquin Delta required by law to maintain flow and water quality standards to protect the beneficial uses within the Delta. Required Delta Outflow - [RDO001] Applied Water Agriculture - [AG010B] Return Flow for Delta Outflow Agriculture - [AG019B] Conveyance Return Flow for Delta Outflow Managed Wetlands - [MW017B] Conveyance Return Flow for Delta Outflow Required Delta Outflow - [RDO002] Return Flow for Delta Outflow Urban - [URB018B] Return Flow for Delta Outflow Urban - [URB027B] Conveyance Return Flow for Delta Outflow

multicropping The practice of growing one or more crops on the same field two or more times within a year. For example, in a single field, broccoli may be grown in the spring and lettuce in the fall.

municipal recycled water Recycled water that wholly or in part is derived from municipal wastewater and is subsequently beneficially reused. Beneficial reuses are not limited to municipal applications.

municipal wastewater Municipal wastewater comes primarily from domestic sources but also includes wastewater from commercial, industrial, and institutional sources that discharge to a common collection system where it mixes with domestic wastewater before treatment.

N

net groundwater extraction The amount of groundwater extraction in excess of total recoverable deep percolation within a water year.

net water use The amount of water needed in a spatial unit to meet all requirements. It includes consumptive use of applied water, irrecoverable water from the distribution system, and the outflow leaving the service area. It does not include reuse of water within a spatial unit, including recoverable deep percolation. Agriculture - [NW001AG] Net Water Use (Applied Water - Reuse) Agriculture - [NW001AGC] Conveyance Net Water Use (Applied Water - Reuse) Urban - [NW001URB] Net Water Use (Applied Water - Reuse) Urban - [NW001URBC] Conveyance Net Water Use (Applied Water - Reuse) Managed Wetlands - [NW001MW] Net Water Use (Applied Water - Reuse) Managed Wetlands - [NW001MWC] Conveyance Net Water Use (Applied Water - Reuse) Instream Flow Requirements - [NW001IFR] Net Water Use (Applied Water - Reuse) Required Delta Outflow - [NW001RDO] Net Water Use (Applied Water - Reuse) Wild and Scenic Rivers - [NW001WSR] Net Water Use (Applied Water - Reuse) Agriculture - [NW002AG] Net Water Use (ETAW + Flow/Salt Sink + Outflow) Agriculture - [NW002AGC] Conveyance Net Water Use (ETAW + Flow/Salt Sink + Outflow) Urban - [NW002URB] Net Water Use (ETAW + Flow/Salt Sink + Outflow) Urban - [NW002URBC] Conveyance Net Water Use (ETAW + Flow/Salt Sink + Outflow) Managed Wetlands - [NW002MW] Net Water Use (ETAW + Flow/Salt Sink + Outflow) Managed Wetlands - [NW002MWC] Conveyance Net Water Use (ETAW + Flow/Salt Sink + Outflow) Instream Flow Requirements - [NW002IFR] Net Water Use (ETAW + Flow/Salt Sink + Outflow) Required Delta Outflow - [NW002RDO] Net Water Use (ETAW + Flow/Salt Sink + Outflow) Wild and Scenic Rivers - [NW002WSR] Net Water Use (ETAW + Flow/Salt Sink + Outflow)

non-potable Water that is unsafe to drink because it contains contaminants and/or is untreated.

O

other federal deliveries The sum of deliveries from federal projects other than the Central Valley Project. Other federal projects include: Black Butte, Klamath project, Solano project, New Hogan Reservoir, Salinas Dam, Cachuma project, Santa Maria project, and Carbon Canyon Reservoir. Water Supplies - [SPL015A] Other Federal Deliveries - Agriculture Water Supplies - [SPL015B] Other Federal Deliveries - Managed Wetlands Water Supplies - [SPL015C] Other Federal Deliveries - Urban Water Supplies - [SPL015D] Other Federal Deliveries - Instream Flow Requirements Water Supplies - [SPL015E] Other Federal Deliveries - Wild and Scenic Rivers Water Supplies - [SPL015F] Other Federal Deliveries - Required Delta Outflow , 53

outflow The amount water leaving a spatial unit.

outflow to Mexico Surface water flow from California to Mexico.

outflow to Nevada Surface water flow from California to Nevada.

outflow to Oregon Surface water flow from California to Oregon.

P

planning area A subsection of a hydrologic region containing a number of detailed analysis units (DAUs).

potable Water that is safe for drinking and cooking.

precipitation The amount of water that falls to the earth as either rain, snow, hail, or is formed on the earth as dew and frost.

prime supply The initial use of surface water or groundwater supply.

R

recoverable water The amount of water that is available for supply or reuse, including surface runoff to non-saline bodies of water and deep percolation that becomes groundwater.

recycled water Volume of water which, as a result of treatment of waste, is suitable for a direct beneficial. It includes wastewater treated, stored, distributed, and reused or recirculated for beneficial uses. Urban - [URB015B] Urban - Wastewater Recycling Urban - [URB015C] Urban - Desalination

regional exports Water transferred out of a hydrologic region.

regional imports Water transferred into a hydrologic region.

return flow Volume of applied water returning to the surface water system. Agriculture - [AG009A] Return Flow to Oregon Agriculture - [AG009B] Return Flow to Nevada Agriculture - [AG009C] Return Flow to Mexico Agriculture - [AG010B] Return Flow for Delta Outflow Instream Flow Requirements - [IFR003B] Return Flow to Oregon - Mexico - Nevada Instream Flow Requirements - [IFR004C] Return Flow to Developed Supply (Other Region) Managed Wetlands - [MW007A] Return Flow to Oregon Managed Wetlands - [MW007B] Return Flow to Nevada Managed Wetlands - [MW007C] Return Flow to Mexico Managed Wetlands - [MW008B] Return Flow for Delta Outflow Managed Wetlands - [MW009D] Return Flow to Carryover Storage for Next Water Year within DAU Managed Wetlands - [MW016A] Conveyance Return Flow to Oregon Managed Wetlands - [MW016B] Conveyance Return Flow to Nevada Managed Wetlands - [MW016C] Conveyance Return Flow to Mexico Managed Wetlands - [MW017B] Conveyance Return Flow for Delta Outflow Required Delta Outflow - [RDO002] Return Flow for Delta Outflow Urban - [URB017A] Return Flow to Oregon Urban - [URB017B] Return Flow to Nevada Urban - [URB017C] Return Flow to Mexico Urban - [URB018B] Return Flow for Delta Outflow Urban - [URB019D] Return Flow to Carryover Storage for Next Water Year within DAU Urban - [URB026A] Conveyance Return Flow to Oregon Urban - [URB026B] Conveyance Return Flow to Nevada Urban - [URB026C] Conveyance Return Flow to Mexico , 47, 48, 49, 50, 54

return flows evaporation and evapotranspiration The volume of return flows evaporation and/or evapotranspiration by weeds and other vegetation in fringes of fields in and near agricultural drains and sump areas. Agriculture - [AG012] Return Flows Evaporation and Evapotranspiration Managed Wetlands - [MW010] Return Flows Evaporation and Evapotranspiration Urban - [URB020] Return Flows Evaporation and Evapotranspiration , 47, 49, 50

return flows to salt sink The volume of return flows that go to saline water bodies, such as the Salton Sea or the ocean, or to saline groundwater basins. Agriculture - [AG010A] Return Flow to Salt Sink Managed Wetlands - [MW008A] Return Flow to Salt Sink Urban - [URB018A] Return Flow to Salt Sink Wild and Scenic Rivers - [WSR003A] Return Flow to Salt Sink Instream Flow Requirements - [IFR003A] Return Flow to Salt Sink Agriculture - [AG019A] Conveyance Return Flows to Salt Sink Managed Wetlands - [MW017A] Conveyance Return Flows to Salt Sink Urban - [URB027A] Conveyance Return Flows to Salt Sink , 47, 49, 50

return-flow system A system of pipelines or ditches to collect and convey surface or subsurface runoff from an irrigated field or landscape for reuse.

return flow to carryover storage - from previous year The surface return flows that were discharged into surface storage from uses the previous year, then supplied for uses the next year. Water Supplies - [SPL002D1] Return Flow to Carryover Storage within DAU from Previous WY - Agriculture Water Supplies - [SPL002D2] Return Flow to Carryover Storage within DAU from Previous WY - Managed Wetlands Water Supplies - [SPL002D3] Return Flow to Carryover Storage within DAU from Previous WY - Urban

return flow to developed supply The surface return flows to channels that are available for use in another spatial unit. Water Supplies - [SPL002A1] Return Flow from Other DAUCO within PA - Agriculture Water Supplies - [SPL002A2] Return Flow from Other DAUCO within PA - Managed Wetlands Water Supplies - [SPL002A3] Return Flow from Other DAUCO within PA - Urban Water Supplies - [SPL002A4] Return Flow from Other DAUCO within PA - Instream Flow Requirements Water Supplies - [SPL002A5] Return Flow from Other DAUCO within PA - Wild and Scenic Rivers Water Supplies - [SPL002A6] Return Flow from Other DAUCO within PA - Required Delta Outflow Water Supplies - [SPL002B1] Return Flow from Other PA - Agriculture Water Supplies - [SPL002B2] Return Flow from Other PA - Managed Wetlands Water Supplies - [SPL002B3] Return Flow from Other PA - Urban Water Supplies - [SPL002B4] Return Flow from Other PA - Instream Flow Requirements Water Supplies - [SPL002B5] Return Flow from Other PA - Wild and Scenic Rivers Water Supplies - [SPL002B6] Return Flow from Other PA - Required Delta Outflow Water Supplies - [SPL002C1] Return Flow from Other Region - Agriculture Water Supplies - [SPL002C2] Return Flow from Other Region - Managed Wetlands Water Supplies - [SPL002C3] Return Flow from Other Region - Urban Water Supplies - [SPL002C4] Return Flow from Other Region - Instream Flow Requirements Water Supplies - [SPL002C5] Return Flow from Other Region - Wild and Scenic Rivers Water Supplies - [SPL002C6] Return Flow from Other Region - Required Delta Outflow Agriculture - [AG020A] Conveyance Return Flow to Developed Supply (Other DAUCO within PA) Agriculture - [AG020B] Conveyance Return Flow to Developed Supply (Other PA) Agriculture - [AG020C] Conveyance Return Flow to Developed Supply (Other Region) Instream Flow Requirements - [IFR004A] Return Flow to Developed Supply (Other DAUCO within PA) Instream Flow Requirements - [IFR004B] Return Flow to Developed Supply (Other PA) Instream Flow Requirements - [IFR004C] Return Flow to Developed Supply (Other Region) Managed Wetlands - [MW009A] Return Flow to Developed Supply (Other DAUCO within PA) Managed Wetlands - [MW009B] Return Flow to Developed Supply (Other PA) Managed Wetlands - [MW009C] Return Flow to Developed Supply (Other Region) Managed Wetlands - [MW018A] Conveyance Return Flow to Developed Supply (Other DAUCO within PA) Managed Wetlands - [MW018B] Conveyance Return Flow to Developed Supply (Other PA) Managed Wetlands - [MW018C] Conveyance Return Flow to Developed Supply (Other Region) Urban - [URB019A] Return Flow to Developed Supply (Other DAUCO within PA) Urban - [URB019B] Return Flow to Developed Supply (Other PA) Urban - [URB019C] Return Flow to Developed Supply (Other Region) Urban - [URB028A] Conveyance Return Flow to Developed Supply (Other DAUCO within PA) Urban - [URB028B] Conveyance Return Flow to Developed Supply (Other PA) Urban - [URB028C] Conveyance Return Flow to Developed Supply (Other Region) , 47, 48, 49, 50, 51, 54

reused water The application of previously used water to meet a beneficial use, whether treated or not, prior to the subsequent use.

reuse groundwater The amount of recoverable deep percolation from untreated, raw applied and conveyance water.

reuse of return flows within spatial unit Fraction of applied water that does not ET or recharge and is reapplied to another beneficial use within the spatial unit rather than becoming return flow out of the spatial unit. (water budget term: reuse of applied water) Agriculture - [AG008] Reuse of Return Flows within DAUCO Instream Flow Requirements - [IFR002] Reuse of Return Flows within DAUCO Managed Wetlands - [MW006] Reuse of Return Flows within DAUCO Urban - [URB015A] Reuse of Return Flows within DAUCO Wild and Scenic Rivers - [WSR002] Reuse of Return Flows within DAUCO

reuse surface water The amount of untreated, raw applied water recaptured for use through surface drainage facilities.

runoff Volume of water flowing into the surface water system within analysis area from precipitation over the land surface.

S

salt sink An end-point of fresh water flow that results in the mixing of fresh water with inorganic salts or ocean salt making it unsuitable as potable water.

seepage The gradual movement of water into, through, or from a porous medium. Also, infiltration of water into soil from canals, ditches, laterals, watercourses, reservoirs, storage facilities, or other water bodies, or from a field.

service area The geographic area served by a water agency.

spatial unit Water balances currently use Detaliled Analysis Units by County (DAUCO) as smallest spatial area for analysis, and aggregate to Planning Areas (PA), County (CO), Hydrologic Regions (HR), and statewide.

S

State Water Project deliveries The delivery of project water to State Water Project contractors. Water Supplies - [SPL012A] State Water Project Deliveries - Agriculture Water Supplies - [SPL012B] State Water Project Deliveries - Managed Wetlands Water Supplies - [SPL012C] State Water Project Deliveries - Urban Water Supplies - [SPL012D] State Water Project Deliveries - Instream Flow Requirements Water Supplies - [SPL012E] State Water Project Deliveries - Wild and Scenic Rivers Water Supplies - [SPL012F] State Water Project Deliveries - Required Delta Outflow

S

surface reservoir change in storage The difference between beginning-of-year and end-of-year surface reservoir water storage for a water year.

surface water As defined under the California Surface Water Treatment Rule, California Code of Regulations Title 22, Section 64651.83, all water open to the atmosphere and subject to surface runoff. This would include all lakes, rivers, streams, and other water bodies. Surface water includes all groundwater sources that are deemed to be under the influence of surface water (i.e., springs, shallow wells, wells close to rivers, etc.), which must comply with the same level of treatment as surface water.

T

total developed supply Prime supply plus return flows from outside the spatial unit. Water Supplies - [SPL023] Total Developed Supply (TDS)

total net supply Total developed supply (TDS) subtract total return flow and reuse (TRFR) within spatial unit. Water Supplies - [SPL027] Total Net Supply (TNS)

total return flow and reuse Reuse of agriculture, urban, managed wetlands, instream flow, and Wild and Scenic return flows within spatial unit plus urban wastewater recycling plus conveyance seepage plus urban desalination. Water Supplies - [SPL024] Total Return Flow and Reuse (TRFR)

total reuse Total return flow and reuse (TRFR) plus total reuse of deep percolation (TRDP). Water Supplies - [SPL028] Total Reuse (TR)

total reuse of deep percolation Deep percolation of applied water plus deep percolation of groundwater recharge plus conveyance deep percolation. Assumes all deep percolation gets extracted in groundwater pumping in the same water year. Water Supplies - [SPL026] Total Reuse of Deep Percolation (TRDP)

total supply and reuse Total developed supply (TDS) plus Total Return Flow Reuse (TRFR) within spatial unit. Water Supplies - [SPL025] Total Supply and Retuse (TSR)

U

unadjudicated Water recharged into groundwater basins that are neither adjudicated nor part of formal contract banking programs. , 52

urban applied water for energy production Amount of water used for hydroelectric or thermoelectric power generation. Urban - [URB008] Applied Water - Energy Production

urban commercial use Amount of water used for commercial water uses such as retail establishments, office buildings, laundries, hotels, campgrounds, gas stations; and institutional water users such as schools, prisons, hospitals, dormitories, nursing homes. Urban - [URB005] Applied Water - Commercial Use

urban desalination Volume of water associated with urban use which, as a result of desalination, is used for a direct beneficial urban use. It includes desalinated water treated, distributed, and reused or recirculated for beneficial uses and excludes ocean desalination. Urban - [URB015C] Urban - Desalination

urban industrial use Amount of water used in water-intensive manufacturing for processing, manufacturing, and other industrial plant uses (e.g., canneries, mills, refineries, and other large, complex users of supply), as defined by the North American Industry Classification System (NAICS). This water can be used as heat transfer water (e.g. cooling water) or for rinsing, washing, diluting, and other sanitation operations. Also included are on-site employee uses and landscape irrigation. Urban - [URB006] Applied Water - Industrial Use

urban large landscape use Amount of water used to irrigate recreational and large landscape areas, such as golf courses, parks, play fields, roadway medians, and cemeteries. Urban - [URB007] Applied Water - Urban Large Landscape

urban residential use - multi-family exterior Amount of water used outside a multi-family residential housing unit. Examples include landscape irrigation, swimming pools, car washing, and the watering of domestic animals. Urban - [URB004] Applied Water - Residential - Multi Family Exterior

urban residential use - multi-family interior Amount of water used within a residential, multi- family housing unit (with two or more units, such as duplexes, apartments, or condominiums), which houses two or more households. Uses include personal hygiene, cooking, drinking, and laundry. Urban - [URB003] Applied Water - Residential - Multi Family Interior

urban residential use - single-family exterior Amount of water used outside a single-family residential housing unit. Examples include landscape irrigation, swimming pools, car washing, and the watering of domestic animals. Urban - [URB002] Applied Water - Residential - Single Family Exterior

urban residential use - single-family interior Amount of water used within a single-family, detached housing unit for such uses as personal hygiene, cooking, drinking, and laundry. Urban - [URB001] Applied Water - Residential - Single Family Interior

urban wastewater produced Amount of water entering wastewater treatment plants and/or septic tanks, excluding stormwater.

urban wastewater recycling Volume of water associated with urban use which, as a result of treatment of waste, is used for a direct beneficial urban use. It includes wastewater treated, distributed, and reused or recirculated for beneficial uses. Urban - [URB015B] Urban - Wastewater Recycling

urban water use Use of potable and non-potable water for residential, commercial, industrial, recreation, energy production, and large landscape.

W

water balances California water balances are simplified water budgets that include the land surface to the root zone. Water balances are a quantification of where and how water was used and the corresponding supply sources for a given water year. The analyses detail the amount of water applied to uses so that use equals supply.

water from refineries The amount of water produced as a byproduct of the oil or gas refining process. Water Supplies - [SPL017A] Water from Refineries - Agriculture Water Supplies - [SPL017B] Water from Refineries - Managed Wetlands Water Supplies - [SPL017C] Water from Refineries - Urban Water Supplies - [SPL017D] Water from Refineries - Instream Flow Requirements Water Supplies - [SPL017E] Water from Refineries - Wild and Scenic Rivers Water Supplies - [SPL017F] Water from Refineries - Required Delta Outflow , 53

water portfolio An accounting of water uses and supplies for a given year statewide or by hydrologic region, subject to availability of data including flow diagrams, flow diagram tables, water balances, summary tables, and information.

water service area A geographic area in which a water agency is the designated water service provider.

watershed A land area from which water drains into a stream, river, or reservoir. A watershed includes all natural and artificial (human-made) features, including its surface and subsurface features, climate and weather patterns, geologic and topographic history, soils and vegetation characteristics, and land use.

water supply Water provided (by nature or a water project) to meet water uses.

water supply exports The amount of water that an area transfers to another to meet needs.

water supply imports The amount of water brought in from other areas to meet needs.

water transfer A temporary or long-term change in the point of diversion, place of use, or purpose of use resulting from a transfer or exchange of water or water rights. A temporary water transfer has a duration of one year or less (California Water Code Section 1728), and a long-term water transfer has a duration of more than one year (California Water Code Section 1735). Many transfers, such as those among contractors of the State Water Project or Central Valley Project, do not fit this definition. A more general definition is that water transfers are a voluntary change in the way water is usually distributed among water users in response to water scarcity. Compare this with water exchanges, which are typically water delivered by one water user to another water user; the receiving water user will return the water at a specified time or when the conditions of the parties to the agreement are met.

water transfer - imported The amount of water transferred across analysis area boundaries from one agency to another. Transfer requires approval from the State Water Resources Control Board for a change in place of use. Also called inter-basin water transfers in water balance data entry sheets. Water Supplies - [SPL019A] Inter-basin Water Transfers - Agriculture Water Supplies - [SPL019B] Inter-basin Water Transfers - Managed Wetlands Water Supplies - [SPL019C] Inter-basin Water Transfers - Urban Water Supplies - [SPL019D] Inter-basin Water Transfers - Instream Flow Requirements Water Supplies - [SPL019E] Inter-basin Water Transfers - Wild and Scenic Rivers Water Supplies - [SPL019F] Inter-basin Water Transfers - Required Delta Outflow

water transfer - regional The amount of water transferred within an analysis area from one agency to another. Transfer requires approval from the State Water Resources Control Board for a change in place of use. Water Supplies - [SPL018A] Water Transfers - Regional - Agriculture Water Supplies - [SPL018B] Water Transfers - Regional - Managed Wetlands Water Supplies - [SPL018C] Water Transfers - Regional - Urban Water Supplies - [SPL018D] Water Transfers - Regional - Instream Flow Requirements Water Supplies - [SPL018E] Water Transfers - Regional - Wild and Scenic Rivers Water Supplies - [SPL018F] Water Transfers - Regional - Required Delta Outflow

water year A continuous 12-month period for which hydrologic records are compiled and summarized. Different agencies may use different calendar periods for their water years. For the California

Department of Water Resources, a water year is October 1 through September 30.

W

Wild and Scenic Rivers The federally designated and State-designated river systems under the 1968 National Wild and Scenic Rivers Act and the 1972 California Wild and Scenic Rivers Act. Many rivers and river reaches in California, including many forks and tributaries, more than 2,000 miles of rivers are designated wild, scenic, or recreational.

Wild and Scenic Rivers water The annual volume of natural flows from the designated State and federal Wild and Scenic Rivers systems. Wild and Scenic Rivers - [WSR001] Applied Water

Glossary - Controlled Vocabulary (CV400)

A

Agriculture - [AG001] Applied Water - Crop Production applied water, , 36
Agriculture - [AG002] Applied Water - Groundwater Recharge applied water, groundwater recharge , 39
Agriculture - [AG003] Evapotranspiration of Applied Water , 38
Agriculture - [AG004] Evaporation and Evapotranspiration of Groundwater Recharge , 39
Agriculture - [AG005] Deep Percolation of Applied Water deep percolation of applied water , 37
Agriculture - [AG006] Deep Percolation of Applied Water to Salt Sink deep percolation of applied water to salt sink , 37
Agriculture - [AG007] Deep Percolation of Groundwater Recharge , 37
Agriculture - [AG008] Reuse of Return Flows within DAUCO , 43
Agriculture - [AG009A] Return Flow to Oregon return flow , 42
Agriculture - [AG009B] Return Flow to Nevada return flow , 42
Agriculture - [AG009C] Return Flow to Mexico return flow , 42
Agriculture - [AG009D] Deep Percolation to Oregon deep percolation , 36
Agriculture - [AG009E] Deep Percolation to Nevada deep percolation , 36
Agriculture - [AG009F] Deep Percolation to Mexico deep percolation , 36
Agriculture - [AG010A] Return Flow to Salt Sink , 42
Agriculture - [AG010B] Return Flow for Delta Outflow Delta outflow return flow , 37, 40, 42
Agriculture - [AG011A] Return Flow to Developed Supply (Other DAUCO within PA) return flow to developed supply
Agriculture - [AG011B] Return Flow to Developed Supply (Other PA) return flow to developed supply
Agriculture - [AG011C] Return Flow to Developed Supply (Other Region) return flow to developed supply
Agriculture - [AG011D] Return Flow to Carryover Storage for Next Water Year within DAU
Agriculture - [AG012] Return Flows Evaporation and Evapotranspiration return flows evaporation and evapotranspiration , 42
Agriculture - [AG017] Conveyance Evaporation and ETAW , 36
Agriculture - [AG018A] Conveyance Return Flow to Oregon conveyance , 35
Agriculture - [AG018B] Conveyance Return Flow to Nevada conveyance , 35
Agriculture - [AG018C] Conveyance Return Flow to Mexico conveyance , 35
Agriculture - [AG018D] Conveyance Deep Percolation to Oregon conveyance deep percolation , 35, 36
Agriculture - [AG018E] Conveyance Deep Percolation to Nevada conveyance deep percolation , 35, 36
Agriculture - [AG018F] Conveyance Deep Percolation to Mexico conveyance deep percolation , 35, 36
Agriculture - [AG019A] Conveyance Return Flows to Salt Sink conveyance return flows to salt sink , 35, 42
Agriculture - [AG019B] Conveyance Return Flow for Delta Outflow conveyance Delta outflow , 35, 37, 40
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Agriculture - [AG020B] Conveyance Return Flow to Developed Supply (Other PA) return flow to developed supply , 36, 43
Agriculture - [AG020C] Conveyance Return Flow to Developed Supply (Other Region) return flow to developed supply , 36, 43
Agriculture - [AG021] Conveyance Seepage conveyance seepage , 36

I

M

Wild and Scenic Rivers - [NW002WSR] Net Water Use (ETAW + Flow/Salt Sink + Outflow) , 41

Wild and Scenic Rivers - [WSR001] Applied Water applied water , 46

Wild and Scenic Rivers - [WSR002] Reuse of Return Flows within DAUCO , 43

Wild and Scenic Rivers - [WSR003A] Return Flow to Salt Sink , 42

Wild and Scenic Rivers - [WSR003B] Return Flow to Oregon - Mexico - Nevada , , return flow

Wild and Scenic Rivers - [WSR003C] Return Flow for Delta Outflow return flow

Wild and Scenic Rivers - [WSR004A] Return Flow to Developed Supply (Other DAUCO within PA) return flow to developed supply

Wild and Scenic Rivers - [WSR004B] Return Flow to Developed Supply (Other PA) return flow to developed supply

Wild and Scenic Rivers - [WSR004C] Return Flow to Developed Supply (Other Region) return flow to developed supply

Table 2: Water Plan Report Table 02: State-level of aggregation. Only two years of data (2019-2000) are displayed due to space limitations.

			ST					
			WY					
			2019			2020		
Category0	CategoryA	Label	AWU	NWU	DEP	AWU	NWU	DEP
Supply	Water Supplies	8000: Environmental Flow	28266.8	28266.8	26345.6	9918.7	9918.7	8611.8
		8010: Local Projects Deliveries	10358.9	10358.9	9702.7	8608.6	8608.6	7670.3
		8020: Local Imported Deliveries	878.4	878.4	822.8	919.9	919.9	819.6
		8030: Colorado River Deliveries	4007.3	4007.3	3753.4	4110.2	4110.2	3662.2
		8040: CVP Base and Project Deliveries	8417.1	8417.1	8014.4	7321.3	7321.3	6749.0
		8050: Other Federal Deliveries	463.0	463.0	433.7	502.5	502.5	447.7
		8060: SWP Deliveries	2381.6	2381.6	2230.7	1912.0	1912.0	1703.6
		8070: Groundwater Net Extraction	6684.2	6684.2	6684.2	11704.0	11704.0	11704.0
		8080: Deep Percolation of Surface and GW	5550.9	.	.	4716.1	.	.
		8090: Return Flow to Carryover Storage	84.7	84.7	84.7	88.7	88.7	88.7
		8100: Reuse Surface Water	23090.0	.	.	14116.0	.	.
		8110: Recycled Water	312.3	.	.	356.3	.	.
		8120: Water from Refineries	30.0	30.0	30.0	30.0	30.0	30.0
		8130: Desalination	48.6	48.6	48.6	44.1	44.1	44.1
		8143: Inflow Drainage	6.0	6.0	6.0	6.1	6.1	6.1
		Subtotal	90579.8	61626.6	58156.7	64354.4	45166.1	41537.2
		Total	90579.8	61626.6	58156.7	64354.4	45166.1	41537.2
Use	Urban	1000: Large Landscape	-613.1	.	.	-810.0	.	.
		1010: Commercial	-1103.5	.	.	-1120.4	.	.
		1020: Industrial	-356.1	.	.	-363.7	.	.
		1030: Energy Production	-97.4	.	.	-119.1	.	.
		1040: Residential for Interior	-2774.6	.	.	-3048.0	.	.
		1050: Residential for Exterior	-1907.6	.	.	-1879.6	.	.
		1060: Evapotranspiration of Applied Water	.	-2083.0	-2083.0	.	-2214.5	-2214.5
		1070: EandET and Deep Perc to Salt Sink	.	-100.6	-100.6	.	-104.5	-104.5
		1080: Outflow	.	-2765.0	-2170.0	.	-2904.3	-2240.5
		1090: Conveyance Applied Water	-326.6	.	.	-328.9	.	.
		1100: Conveyance Evaporation and ETAW	.	-205.1	-205.1	.	-201.2	-201.2
		1110: Conveyance Deep Perc to Salt Sink	.	-1.4	-1.4	.	-2.9	-2.9
		1120: Conveyance Outflow	.	-6.3	-1.6	.	-4.3	-1.6
		1130: Groundwater Recharge Applied Water	-746.0	.	.	-351.9	.	.
		1140: GW Recharge Evap and Evapotranspiration	.	-31.5	-31.5	.	-33.2	-33.2
		Subtotal	-7924.9	-5192.9	-4593.2	-8021.6	-5464.9	-4798.4
	Agriculture	2000: Applied Water for Crop Production	-27511.5	.	.	-29240.2	.	.
		2010: Evapotranspiration of Applied Water	.	-22223.3	-22223.3	.	-23506.4	-23506.4
		2020: EandET and Deep Perc to Salt Sink	.	-938.9	-938.9	.	-963.3	-963.3
		2030: Outflow	.	-2454.6	-665.7	.	-2556.0	-712.9
		2040: Conveyance Applied Water	-2937.0	.	.	-2671.2	.	.
		2050: Conveyance Evaporation and ETAW	.	-1014.1	-1014.1	.	-864.6	-864.6
		2060: Conveyance Deep Perc to Salt Sink	.	-5.7	-5.7	.	-5.8	-5.8

Table 2: (continued)

	2070: Conveyance Outflow	.	-531.8	-40.0	.	-537.7	-11.8
	2080: Groundwater Recharge Applied Water	-1166.9	.	.	-502.3	.	.
	2090: GW Recharge Evap and Evapotranspiration	.	-4.9	-4.9	.	-5.3	-5.3
	Subtotal	-31615.4	-27173.3	-24892.6	-32413.7	-28439.1	-26070.1
Instream Flow Requirements	3000: Applied Water	-7683.4	.	.	-6437.6	.	.
	3010: Outflow	.	-5708.3	-5708.3	.	-4690.3	-4690.3
	Subtotal	-7683.4	-5708.3	-5708.3	-6437.6	-4690.3	-4690.3
Wild and Scenic	4000: Applied Water	-33433.4	.	.	-11394.0	.	.
	4010: Outflow	.	-22667.2	-22667.2	.	-7842.2	-7842.2
	Subtotal	-33433.4	-22667.2	-22667.2	-11394.0	-7842.2	-7842.2
Required Delta Outflow	5000: Applied Water	-8403.0	.	.	-4430.5	.	.
	5010: Outflow	.	-8403.0	-8403.0	.	-4430.5	-4430.5
	Subtotal	-8403.0	-8403.0	-8403.0	-4430.5	-4430.5	-4430.5
Managed Wetlands	6000: Applied Water	-1414.3	.	.	-1540.4	.	.
	6010: Evapotranspiration of Applied Water	.	-592.5	-592.5	.	-715.9	-715.9
	6020: E and ET and Deep Perc to Salt Sink	.	-21.4	-21.4	.	-22.7	-22.7
	6030: Outflow	.	-653.7	-95.9	.	-637.6	-78.8
	6040: Conveyance Applied Water	-105.4	.	.	-116.6	.	.
	6050: Conveyance Evaporation and ETAW	.	-9.9	-9.9	.	-11.2	-11.2
	6060: Conveyance Deep Perc to Salt Sink	.	0.0	0.0	.	0.0	0.0
	6070: Conveyance Outflow	.	-45.0	-13.3	.	-47.9	-13.3
	Subtotal	-1519.7	-1322.5	-733.0	-1657.0	-1435.3	-841.9
	Total	-90579.8	-70467.2	-66997.3	-64354.4	-52302.3	-48673.4
	Anomaly	-0.0	-8840.6	-8840.6	0.0	-7136.2	-7136.2

References

[1] R Core Team, R: A language and environment for statistical computing, R Foundation for Statistical Computing, Vienna, Austria. Accessed 02 Dec-2022., 2019.